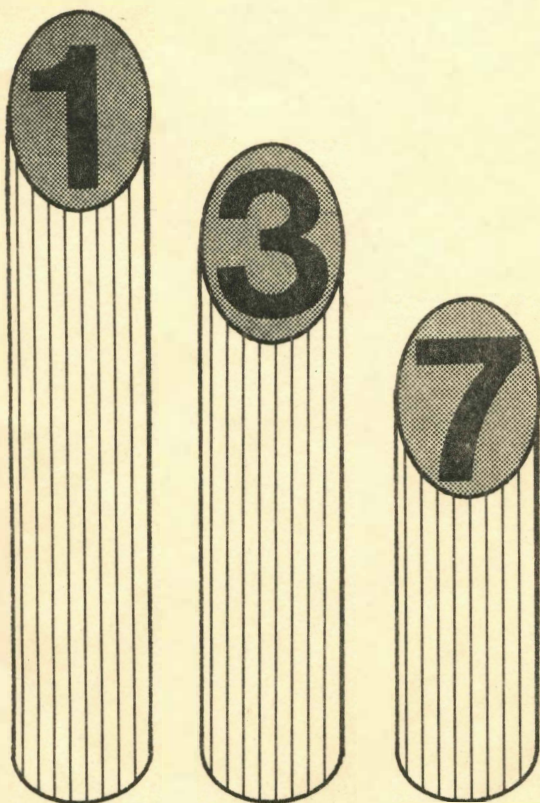


JUN 1 1983

RANKING THE RECREATIONAL VALUES & ASSOCIATED PROBLEMS OF MISSOURI'S MAJOR WATERSHEDS



A Reference Document

Prepared For

The Regional Watershed Assessment Plan

RANKING THE
RECREATIONAL VALUES AND ASSOCIATED PROBLEMS
OF MISSOURI'S MAJOR WATERSHEDS

October 1982

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Prepared For

The Regional Watershed Assessment Plan

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TABLE OF CONTENTS

Summary.....	i
Survey Technique.....	i
Survey Findings.....	i
Recommendations.....	ii
 Introduction.....	 1
 Procedures.....	 1
Watersheds Evaluated.....	1
Persons Interviewed.....	2
Questionnaires.....	2
Distribution/Response.....	2
Tabulation.....	3
 Statewide Assessment.....	 5
Rank of Watershed Recreational Values.....	5
Ranking of Problem Categories.....	13
Dependability of Survey Effort.....	15
 Discussion / Recommendations	 19
 Bibliography.....	 21
 Appendix	
1. Watershed Boundaries Designated for Study Purposes By the Regional Watershed Assessment Task Force.....	23
2. Letter of Transmittal for Questionnaires.....	27
3. Problems Questionnaire.....	29
4. Ten Most Important Watersheds Questionnaire.....	31
5. Present And Future Watershed Problem Scores Ranked By Quartiles.....	33
6. Recreational Values And Problems By Watershed.....	37
Big River.....	39
Big Piney River.....	40
Black River.....	41
Blackwater River.....	42

TABLE OF CONTENTS (continued)

Bourbeuse River.....	43
Chariton River.....	44
Cuivre River.....	45
Current River.....	46
Eleven Point River.....	47
Elk River.....	48
Fabius River.....	49
Fox River.....	50
Gasconade River.....	51
Grand River.....	52
Headwater Diversion.....	53
Jacks Fork River.....	54
James River.....	55
Lamine River.....	56
Meramec River.....	57
Mississippi River, Upper.....	58
Missouri River.....	59
Moreau River.....	60
Niangua River.....	61
Nodaway River.....	62
North River.....	63
Osage River, Eastern.....	64
Osage River, Western.....	65
Platte River.....	66
Pomme de Terre River.....	67
Sac River.....	68
St. Francis River.....	69
Salt River.....	70
South Grand River.....	71
Spring River.....	72
Thompson River.....	73
White River.....	74
White River, North Fork.....	75
Wyaconda River.....	76

SURVEY TECHNIQUE

The opinions of the professional staff of public agencies involved in resource management were surveyed to identify the recreational values and problems affecting flowing waters within Missouri's major watersheds. The study was a joint project of the Missouri Department of Conservation and Department of Natural Resources.

Two questionnaires were developed for the survey. The first asked professional workers their opinion of how selected problem categories affect the recreational value of watersheds in their local area (see Appendix 3, page 29). It also asked how important they believe their local watersheds are for recreational use. A second questionnaire asked them to list the ten best recreational watersheds in the state (see Appendix 4, page 31).

More than 550 professional staff members from six selected agencies received questionnaires, and approximately 39 percent returned them. The agencies contacted included the Soil Conservation Service, Regional Planning Commissions, Agricultural Stabilization and Conservation Service, 4-H Regional Offices of the University of Missouri Extension Service, state park superintendents of the Missouri Department of Natural Resources and representatives of the Missouri Department of Conservation. Most respondents had field responsibilities and several years of experience in their local area.

Respondents represent a broad range of interdisciplinary backgrounds. The study assumes they have informed opinions concerning the recreational values and issues affecting their local watersheds. It also assumes that the respondents have informed opinions of watershed conditions outside their immediate jurisdiction by reason of previous professional assignments or travels. Respondents were asked to disqualify themselves if they felt unable to offer an objective opinion on a questionnaire.

SURVEY FINDINGS

Currently, the ten highest rated recreational watersheds (in descending order) are the Current, Meramec, Eleven Point, Gasconade, Jacks Fork, Missouri, Piney, Upper Mississippi, Niangua, and Eastern Osage (see Table 3, page 8).

In the future, the ten most important recreational watersheds (in descending order) are expected to be the Missouri, ~~Upper Mississippi~~, Meramec, Current, Gasconade, Eleven Point, Piney, Grand, Eastern Osage, and Jacks Fork (see Table 4, page 9). The watersheds expected to show the greatest increase and decrease in future recreational value are:

<u>Increase in Rank</u>		<u>Decrease in Rank</u>	
Chariton	+12	Black	-10
Grand	+ 8	Niangua	-10
Salt	+ 7	N. Fork White	- 9
Platte	+ 7	Pomme de Terre	- 7
Upper Mississippi	+ 6	White	- 6
Cuivre	+ 6		

At present, the three most important problems affecting the recreational value of watersheds are Poor Land Use, Intensive Agricultural Use, and Intensive Recreational Use. All are ranked moderately severe (see Figure 4, page 14).

The three most important problems in the future are expected to be Poor Land Use, Intensive Agricultural Use, and Intensive Recreational Use. Poor Land Use is expected to become a severe problem, while Intensive Recreational Use is expected to show the most significant increase (see Figure 4, Page 14).

The three problems expected to show the greatest increase in the future are Intensive Recreational Use, Pollution, and Water Withdrawal (see Figure 4, page 14).

RECOMMENDATIONS

- The survey should periodically be readministered to monitor the opinions of professional resource workers. In subsequent surveys, watersheds should be subdivided to produce further insight to the values and problems affecting them. Problem categories such as Poor Land Use should be further defined.
- Respondents feel Poor Land Use, Intensive Agricultural Use, and Pollution are the principal problems affecting watersheds. Therefore, the final plan should work to strengthen the ability of agencies to improve soil and water conditions.
- A trend toward heavier usage of Missouri's large rivers and urban watersheds is expected in the future. Agencies should therefore emphasize projects which encourage recreational access to the Missouri River, the Mississippi River, and urban waterfront areas.
- Although water withdrawals are not seen as a current problem, they are expected to increase in severity in the future. The protection of instream flows for recreational use, as well as fish and wildlife, is needed to insure that adequate water resources are available.
- The Regional Watershed Assessment Plan should be provided to the public so they can make informed decisions about how the water resources of the state should be used. Facts from the plan should be prepared in popular form and widely distributed to the public.
- Potential solutions to the problems examined in this study have been recently addressed in Missouri. Both the Resources Conservation Act Assessment and the Statewide Comprehensive Outdoor Recreation Plan had extensive input from the public and governmental agencies. The findings of these studies should be used by the Regional Watershed Assessment Task Force in recommending a viable statewide action plan.

1

RANKING THE
RECREATIONAL VALUES AND ASSOCIATED PROBLEMS
OF MISSOURI'S MAJOR WATERSHEDS

INTRODUCTION

In 1981, the Missouri departments of Natural Resources and Conservation began preparing a Regional Watershed Assessment. The goal is to identify the problems affecting the many uses of water in Missouri. This information will be used to refine programs and statutes which affect the use and quality of water in the state. Included among the watershed problems and uses are recreation, availability of potable water supply, industrial water consumption, erosion and sedimentation, and sand and gravel dredging.

Missouri's 55,370 miles of streams and rivers are among the state's most widespread and varied recreational resources. Missourians have voiced strong feelings about the issue of river-oriented recreation. In the 1980-85 State-wide Comprehensive Outdoor Recreation Plan and a follow-up survey by the Department of Natural Resources, river recreation ranked in the Very Important category (6th out of 16 issues).

This report focuses on the recreational use of rivers and other flowing waters within major watersheds. Studies documenting recreational demand exist for some of the state's rivers. However, they generally do not address recreational values or problems. To supplement this information, an opinion survey of professional resource managers was undertaken. The survey asked informed professionals to give their perception of the recreational value of the flowing waters of major watersheds. It also asked professionals to rank problem categories which may affect the recreational use of the rivers within the watersheds. (Note: Recreational uses and problems affecting impoundments will be addressed in a separate report.)

PROCEDURES

WATERSHEDS EVALUATED

The Regional Watershed Assessment Task Force divided the state into "watersheds" for study purposes. Using the watershed approach may suit the identification of broad categories of water use; however, it presents a challenge when determining the recreational value of such a diverse resource as rivers. The recreational amenities of a river near the headwaters are often different from the conditions near the mouth. The generalized watershed system was nevertheless used to conform with the guidelines established by the Regional Watershed Assessment Task Force.

A total of 38 watersheds were surveyed (see Appendix 1, page 23). However, these do not directly correspond to the 38 watersheds described by the Task Force, since the Osage Fork River was inadvertently omitted. Because of distinct differences in resources, this study divided the watershed of the Osage River into the eastern and western basins. Also, because of a low response rate (n=4) for the watershed of the Little Piney River, it was combined with the Big Piney River for analysis.

PERSONS INTERVIEWED

Professional staff of resource managing agencies with field-level offices comprised the bulk of the population interviewed. Respondents represented the Soil Conservation Service, Regional Planning Commissions, Agricultural Stabilization and Conservation Service, 4-H Regional Offices of the University of Missouri Extension Service, state park superintendents of the Department of Natural Resources, and the Department of Conservation.

These agencies were selected because their professional staff represents a broad range of interdisciplinary backgrounds at the county level. The study assumes that respondents have informed opinions concerning the broad recreational issues affecting the watersheds in their local areas. Also, because their work is locally oriented, their opinions are assumed to be based on some level of direct observation. The study further assumes that respondents have similar knowledge of many other watersheds.

QUESTIONNAIRES

Two questionnaires were developed for the assessment and field-tested by the Department of Conservation. A Problems Questionnaire asked respondents to indicate how they feel broad problem categories currently are affecting major watersheds (see Appendix 3, page 29). The questionnaire also asked how they expect the problems to affect the watersheds in the future. A "problem" was defined as any factor that limits or detracts from the recreational experience or reduces the ability of the resource to support recreational use.

The Problems Questionnaire also rated each watershed's recreational value. Respondents were asked to consider any recreational use which might be found on or along a river or its tributaries within their local area. "Recreation" was defined as any leisure-time activity requiring the presence of water or which is water-related.

The second questionnaire, Most Important Watersheds (see Appendix 4, page 31), asked respondents to select the ten watersheds they currently consider to have the most recreational value and rank them in descending order. The same process was repeated for the ten watersheds they felt could become the most important in the future.

Respondents were given the option of disqualifying themselves on either questionnaire if they felt they did not have an objective opinion. The Problems Questionnaire indicates how a watershed in the respondent's local area may be affected by the various problem categories as well as its perceived value as a local recreational resource. The Most Important Watersheds Questionnaire then suggests how watersheds rank on a statewide basis.

DISTRIBUTION / RESPONSE

A total of 554 sets of questionnaires were mailed to the agencies shown in Table 1. The Problems Questionnaire was distributed to field personnel by watershed(s). In this way respondents commented only on the watersheds within their own local area of responsibility. A total of 987 copies of the Problems Questionnaire were returned.

The Most Important Watersheds Questionnaire was given to all professionals sampled. A total of 217 were returned, for a response rate of 39 percent. Of those, 33 contained a statement indicating that the respondent did not feel qualified to express an opinion. Information from this questionnaire was therefore generated by only 33 percent of the sample universe.

It should be noted that due to a high response rate by the Department of Conservation, the survey strongly reflects the opinions of that agency's professional staff. In regard to the Problems Questionnaire, the response rate of the Department's staff, compared to that of other agencies, is 4 to 1. Their response rate to the Most Important Watersheds Questionnaire was 3 to 1.

TABLE 1
NUMBER OF INDIVIDUALS RECEIVING QUESTIONNAIRES

<u>AGENCY</u>	<u>NUMBER OF INDIVIDUALS</u>
Agricultural Stabilization & Conservation Ser.	114
University Extension, 4-H	58
Dept. of Natural Resources, State Park Super.	43
Regional Planning Commissions	20
Soil Conservation Service, Regional Offices	8
Dept. of Conservation, County Field Agents	311
	<u>554</u>

TABULATION AND ANALYSIS

Questionnaires were jointly tabulated by the Department of Natural Resources and Department of Conservation. Data processing was completed using the State of Missouri's computer and the Statistical Analysis System (SAS).

The relative standing of the problem categories and the recreational value rating from the Problem Questionnaire (Appendix 3) were obtained by calculating the mean score for each parameter by watershed. Mean scores were computed to five decimal points for ranking cumulative values. Means are shown in this report rounded to one place for brevity. The conventional technique for ranking tied scores (i.e., ...2, 3.5, 3.5, 5...) was used to the fifth decimal place.

Narrative terms are frequently used to show problem severity or recreational value as indicated by the mean scores. These narrative terms are categorized as: Low = Mean Score of 1-3; Moderate = 4-6; and High Recreational Value or Severe Problem = 7-10. In most cases the top three problems were considered to be most significant for the narrative discussion. Problem categories for each watershed are listed in this report on the basis of their rank order for the watershed in question rather than the order in which they appeared in the questionnaire. Change in rank order from present to future is indicated in this report by a plus (+), minus (-), or zero (0) in the case of no change.

The relative standing of Present and Future Recreational Worth of a particular watershed when compared to the other 37 watersheds was computed by aggregating the number of times each watershed was listed in a particular 1-10 ranking category (see Appendix 4). The total score for a particular watershed's present or future worth was then determined by weighing the times it was listed for a particular ranking. Each watershed was then ranked in respect to all other watersheds on the basis of these total weighted scores.

The analysis of respondents' opinions was divided into two main parts: (1) a review of returns for each individual watershed and (2) an aggregation of all returns for a statewide analysis. Tables 9-47 are concerned with the individual watersheds; Tables 2-8 and Figures 1-4 treat the statewide analysis.

Individual watersheds were frequently assessed using a comparison of the Mean Recreational Value on a scale of 1-10 and the Recreational Rank of Present and Future Worth. This assessment sometimes employs the term "recreational resource potential" which carries no connotation of recreational carrying capacity, aesthetics, or other amenities.

Respondents had three independent opportunities to rate the relative standing of a recreational resource--first, from their own sense of a stream's intrinsic value; second, from its present relative standing among all other stream systems; and finally, a perceived notion of future standing as a recreational resource. We found it instructive to compare the rankings of these three parameters to develop some grasp of the potential a particular watershed might serve as a recreational resource to the public, now and in the future. In many cases, this "potential" was tempered by the problems confronting use.

In the development of a statewide analysis, we found a need for a single expression of recreational value. The cumulative index, or sum of the ranked recreational scores for each watershed was developed for this purpose (see Table 5, page 11).

RANK OF WATERSHED RECREATIONAL VALUES

Respondents were asked to rate the recreational value of the watersheds within their local area. This resulted in a calculation of the mean recreational value shown in Table 2, page 6. These values can be categorized as High 7-10, Moderate 4-6, and Low 1-3. Table 2 indicates that 18 watersheds (47 percent) are categorized as high-value resources; 20 watersheds (53 percent) have moderate value, and none are rated in the Low category. This is not to say that Missouri is without low-value streams. Rather, it is more a function of the large scale (watershed) at which respondents were instructed to make their evaluations. If this survey is repeated in the future, a subdivision of the watersheds may provide more detail for interpretation of recreational values.

Respondents were also asked to rank, in descending order, the ten watersheds they currently consider to have the most recreational value. The same question was repeated for the ten watersheds they feel could become the most important in the future. Figure 1 (page 7) shows the area of the state involved by the top ten watersheds. The major difference between the two lists in Figure 1 is that the Niangua watershed is expected to be replaced by the Grand watershed as one of the top ten watersheds in the future.

Tables 3 and 4 (pages 8 and 9) show how respondents perceive the present and future recreational worth of the 38 watersheds studied. Figure 2 (page 10) shows the change in rank between present and future recreational worth. The watersheds expected to have the greatest change in recreational value are:

<u>Increase in Rank</u>		<u>Decrease in Rank</u>	
Chariton	+12	Black	-10
Grand	+ 8	Niangua	-10
Salt	+ 7	N. Fork White	- 9
Platte	+ 7	Pomme de Terre	- 7
Upper Mississippi	+ 6	White	- 6
Cuivre	+ 6		

The overall rank of recreational watersheds is based on a comparison of the cumulative index shown in Table 5 (see page 11). (In the case of ties, watersheds are listed alphabetically.) This index is the sum of the rank scores for each watershed's Mean Recreational Value, Present Worth and Future Worth. A comparison of the top quartile watersheds in Figure 1 (see page 7) and Table 5 indicates that the Grand River is the only watershed listed only once. This suggests a high degree of consistency in the respondents' opinions concerning the top-quartile watersheds. Figure 3 shows the overall rank of watershed recreational values ranked by the Cumulative Index.

Table 2

RANKING OF WATERSHEDS BY MEAN RECREATIONAL VALUE
 Note: Ranking is divided into approximate quartiles

<u>Watershed</u>	<u>Times Listed</u>	<u>Mean Value</u>	<u>Standard Deviation</u>
Current River	19	9.3	0.9
Jacks Fork River	12	9.3	1.1
Meramec River	31	9.2	1.3
Eleven Point River	12	8.9	1.6
Big River	22	8.5	1.7
Mississippi River, Upper	37	8.2	1.9
Gasconade River	24	8.2	1.6
Niangua River	17	8.1	1.7
White River, North Fork	14	8.0	2.3
Osage River, Western	20	8.0	1.8
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Black River	18	7.9	1.3
White River	17	7.6	2.7
Big Piney River	18	7.5	1.9
St. Francis River	19	7.5	1.8
Missouri River	59	7.3	2.0
Osage River, Eastern	21	7.3	1.4
Pomme de Terre River	22	7.1	2.2
Bourbeuse River	20	7.1	2.2
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Elk River	9	6.9	2.0
Platte River	21	6.9	2.7
James River	15	6.5	1.9
Salt River	19	6.5	2.2
Grand River	23	6.5	2.6
Sac River	18	6.4	2.2
South Grand River	18	6.4	2.7
Headwater Diversion	13	6.3	2.1
Lamine River	17	6.0	2.0
Spring River	14	5.7	1.6
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Cuivre River	13	5.7	1.5
Chariton River	18	5.4	2.0
Blackwater River	20	5.1	2.4
Nodaway River	14	4.8	2.5
Fabius River	12	4.7	2.4
Moreau River	11	4.6	1.9
Thompson River	15	4.3	2.1
Wyaconda River	6	4.2	1.5
Fox River	6	4.0	2.8
North River	8	4.0	1.9

TOP TEN WATERSHEDS HAVING THE MOST RECREATIONAL VALUE

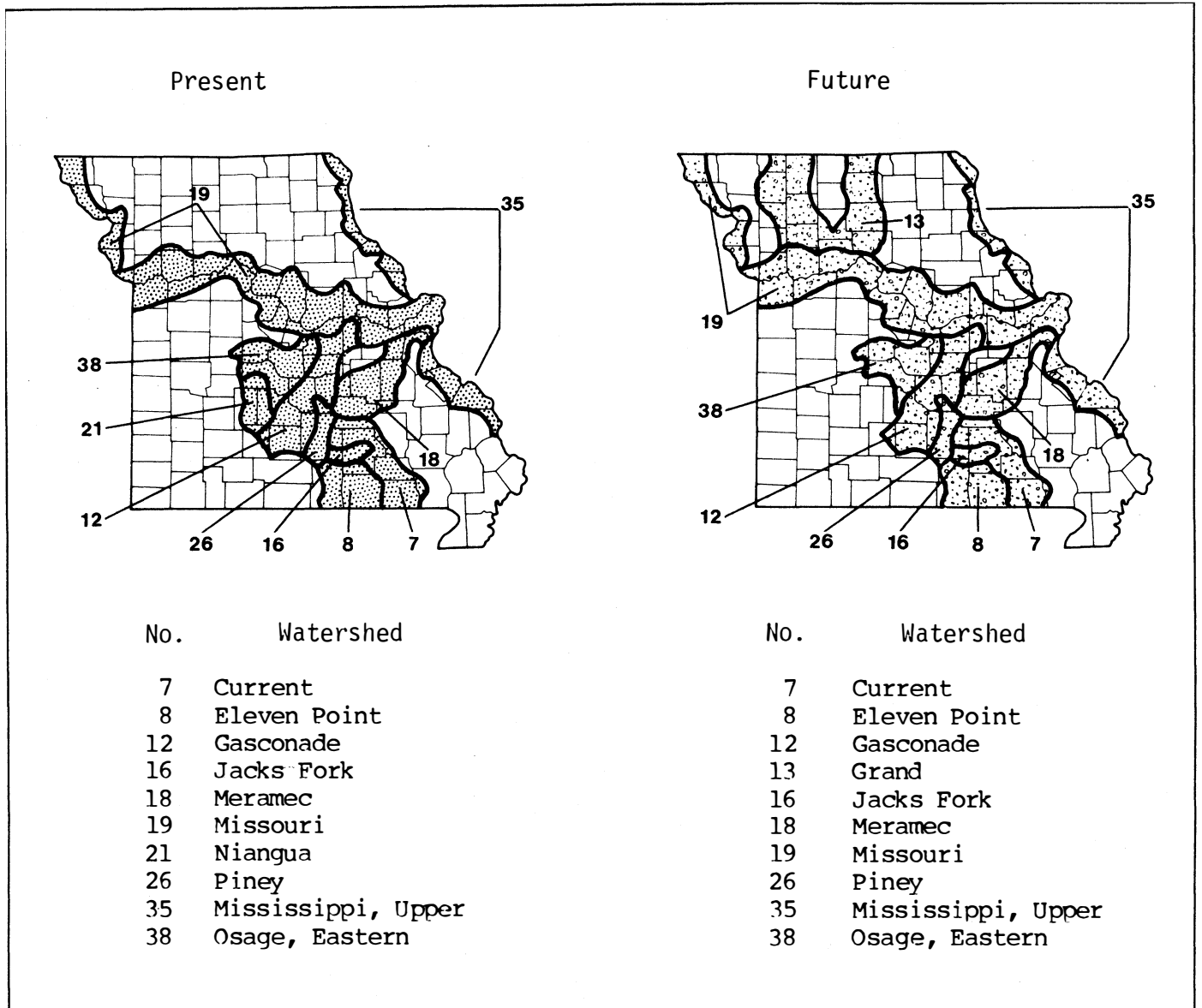


Table 3

RANKING OF WATERSHEDS BY PRESENT RECREATIONAL WORTH

Note: Ranking is divided into approximate quartiles

<u>Watershed</u>	<u>Times Listed</u>	<u>Total Scores</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
Current River	179	1491	8.3	2.5
Meramec River	142	1056	7.4	2.4
Eleven Point River	154	969	6.3	2.5
Gasconade River	166	955	5.8	2.2
Jacks Fork River	140	841	6.0	2.6
Missouri River	106	630	5.9	3.3
Big Piney River	142	616	4.3	2.2
Mississippi River, Upper	95	564	5.9	3.3
Niangua River	103	458	4.4	2.4
Osage River, Eastern	70	379	5.4	3.2
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White River	61	361	5.9	2.8
White River, North Fork	69	357	5.2	2.4
St. Francis River	75	310	4.1	2.3
Black River	69	305	4.4	2.4
Pomme de Terre River	47	219	4.7	2.9
Grand River	46	218	4.7	3.0
James River	43	196	4.6	2.6
Big River	40	172	4.3	2.7
Salt River	33	159	4.8	2.6
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Bourbeuse River	32	150	4.7	2.6
Osage River, Western	34	150	4.4	2.9
Platte River	29	124	4.3	2.4
Sac River	24	115	4.8	2.4
Elk River	17	83	4.9	3.1
Chariton River	19	82	4.3	2.8
Blackwater River	13	64	4.9	2.4
South Grand River	12	63	5.3	3.3
Spring River	12	55	4.6	3.3
Nodaway River	11	52	4.7	2.9
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Lamine River	12	50	4.2	2.4
Thompson River	8	46	5.8	2.8
Cuivre River	12	45	3.8	2.5
Fabius River	10	39	3.9	1.9
North River	3	17	5.7	0.6
Moreau River	4	10	2.5	1.0
Fox River	2	9	4.5	4.9
Wyaconda River	2	9	4.5	3.5
Headwater Diversion	4	6	1.5	1.0

Table 4

RANKING OF WATERSHEDS BY FUTURE RECREATIONAL WORTH

Note: Ranking is divided into approximate quartiles

<u>Watershed</u>	<u>Times Listed</u>	<u>Total Scores</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
Missouri River	124	982	7.9	2.6
Mississippi River, Upper	103	751	7.3	2.9
Meramec River	94	716	7.6	2.4
Current River	88	665	7.6	2.7
Gasconade River	91	489	5.4	2.5
Eleven Point River	77	442	5.7	2.5
Big Piney River	95	440	4.6	2.5
Grand River	68	375	5.5	3.1
Osage River, Eastern	65	375	5.8	2.8
Jacks Fork River	66	359	5.4	2.7
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St. Francis River	61	334	5.5	2.7
Salt River	59	310	5.3	2.9
Chariton River	62	296	4.8	2.7
James River	54	292	5.4	2.2
Platte River	54	282	5.2	2.6
Osage River, Western	50	273	5.5	2.7
White River	46	269	5.8	2.9
Big River	54	260	4.8	2.7
Niangua River	54	246	4.6	2.7
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Sac River	46	238	5.2	2.3
White River, North Fork	43	230	5.3	2.5
Pomme de Terre River	46	214	4.7	2.4
Bourbeuse River	42	203	4.8	2.7
Black River	40	192	4.8	2.4
South Grand River	38	175	4.6	3.1
Cuivre River	34	156	4.6	2.7
Nodaway River	30	149	5.0	2.5
Lamine River	29	122	4.2	2.4
Elk River	23	109	4.7	3.1
<hr/>				
Blackwater River	26	107	4.1	2.3
Spring River	23	101	4.4	2.8
Thompson River	12	66	5.5	3.2
Fabius River	18	64	3.6	1.9
Moreau River	16	40	2.5	1.9
North River	9	36	4.0	1.9
Headwater Diversion	8	29	3.6	2.2
Fox River	6	25	4.2	2.5
Wyaconda River	7	20	2.9	2.1

Figure 2

CHANGE IN RANK BETWEEN PRESENT & FUTURE WATERSHED RECREATIONAL WORTH

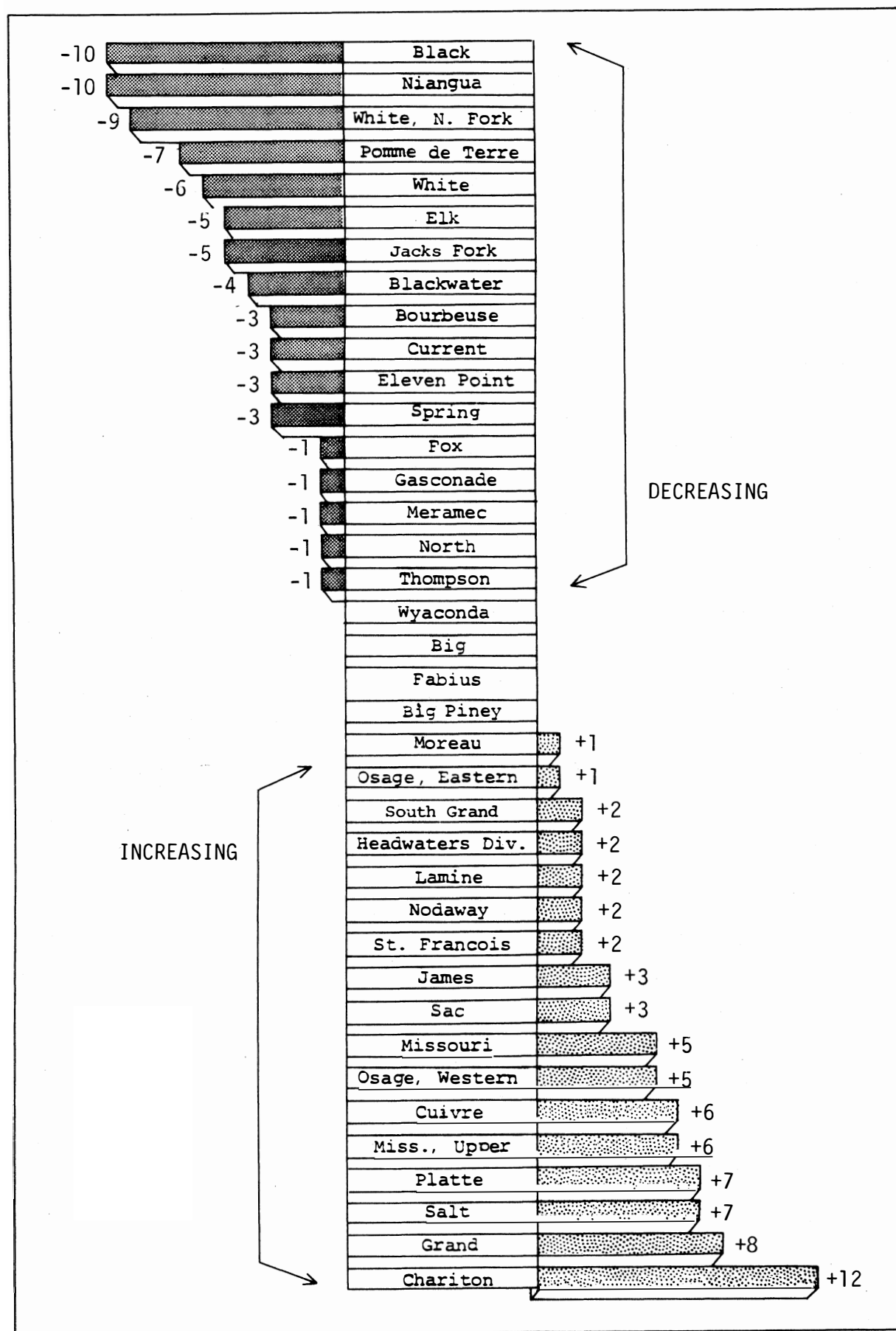


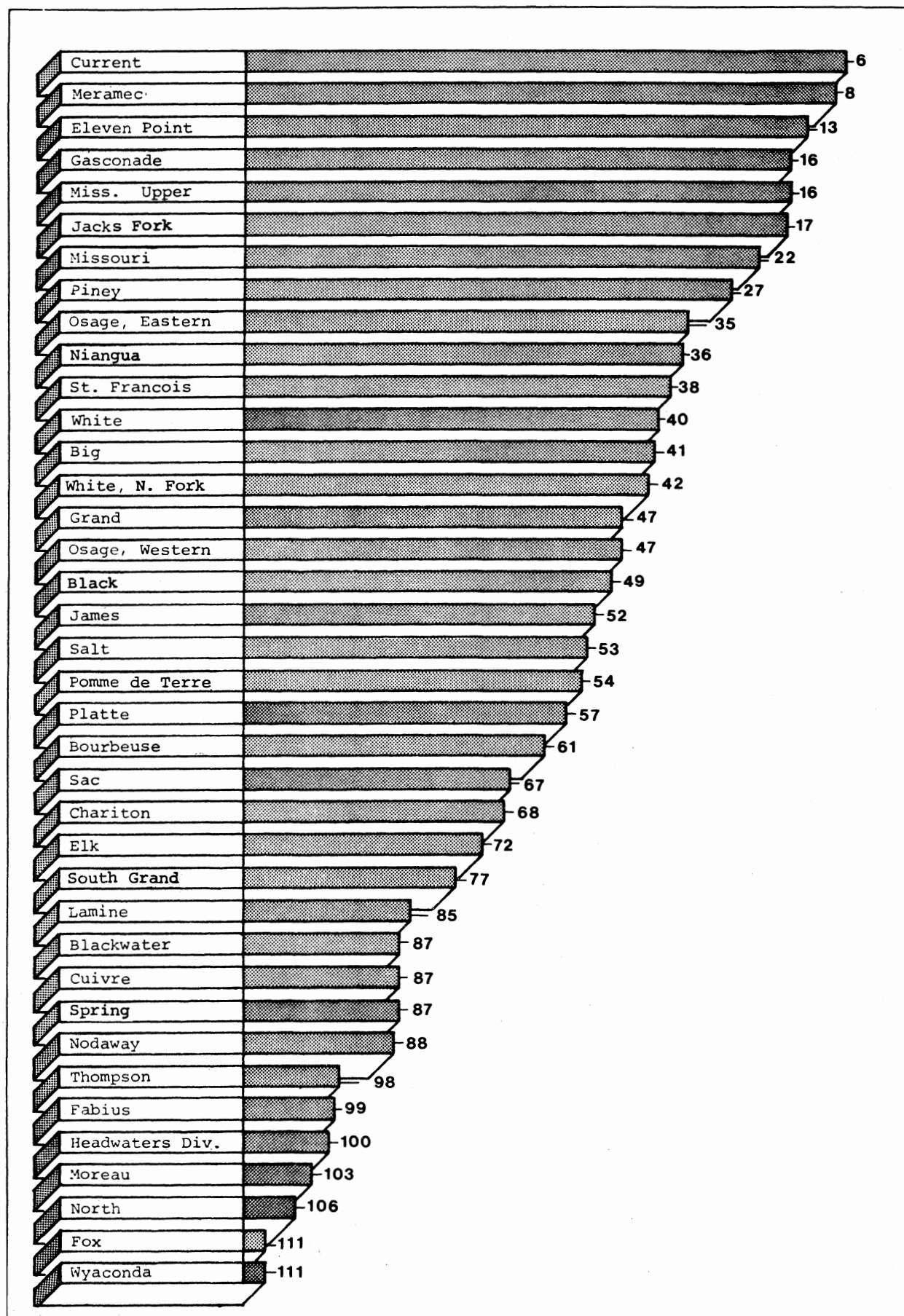
Table 5

OVERALL RANK OF WATERSHED RECREATIONAL VALUES (CUMULATIVE INDEX)

Note: Ranking is divided into approximate quartiles

Watershed	Cumulative Index (A+B+C)	Mean Rec. Value (scale 1-10)		Recreational Worth Among 38 Watersheds	
		Mean	(A) Rank	(B) Present	(C) Future
Current River	6	9.3	1	1	4
Meramec River	8	9.2	3	2	3
Eleven Point River	13	8.9	4	3	6
Gasconade River	16	8.2	7	4	5
Mississippi, Upper	16	8.2	6	8	2
Jacks Fork River	17	9.3	2	5	10
Missouri River	22	7.3	15	6	1
Big Piney River	27	7.5	13	7	7
Osage River, Eastern	35	7.3	16	10	9
Niangua River	36	8.1	8	9	19
<hr/>					
St. Francois River	38	7.5	14	13	11
White River	40	7.6	12	11	17
Big River	41	8.5	5	18	18
White, North Fork	42	8.0	9.5	12	21
Grand River	47	6.5	23	16	8
Osage River, Western	47	8.0	9.5	21	16
Black River	49	7.9	11	14	24
James River	52	6.5	21	17	14
Salt River	53	6.5	22	19	12
<hr/>					
Pomme de Terre River	54	7.1	17	15	22
Platte River	57	6.9	20	22	15
Bourbeuse River	61	7.1	18	20	23
Sac River	67	6.4	24.5	23	20
Chariton River	68	5.4	30	25	13
Elk River	72	6.9	19	24	29
South Grand River	77	6.4	24.5	27	25
Lamine River	85	6.0	27	30	28
Blackwater River	87	5.1	31	26	30
Cuivre River	87	5.7	29	32	26
<hr/>					
Spring River	87	5.7	28	28	31
Nodaway River	88	4.8	32	29	27
Thompson River	98	4.3	35	31	32
Fabius River	99	4.7	33	33	33
Headwaters Diversion	100	6.3	26	38	36
Moreau River	103	4.6	34	35	34
North River	106	4.0	37.5	34	35
Fox River	111	4.0	37.5	36	37
Wyaconda River	111	4.2	36	37	38

OVERALL RANK OF WATERSHED RECREATIONAL VALUES, BY CUMULATIVE INDEX



RANKING OF PROBLEM CATEGORIES

Problem category scores listed in Tables 10-47 were averaged to indicate the statewide significance of each problem (see Appendix 5, page 33). Table 6 summarizes this tabulation. The top five current problem categories are moderate in severity. They are Poor Land Use, Intensive Agricultural Use, Channel Modification, Pollution, and Bank or Shoreline Development. In the future, Poor Land Use is expected to retain its top ranking and become severe in magnitude. The remaining problem categories are expected to remain moderately severe. Figure 4 (page 14) shows this relationship graphically.

Table 6

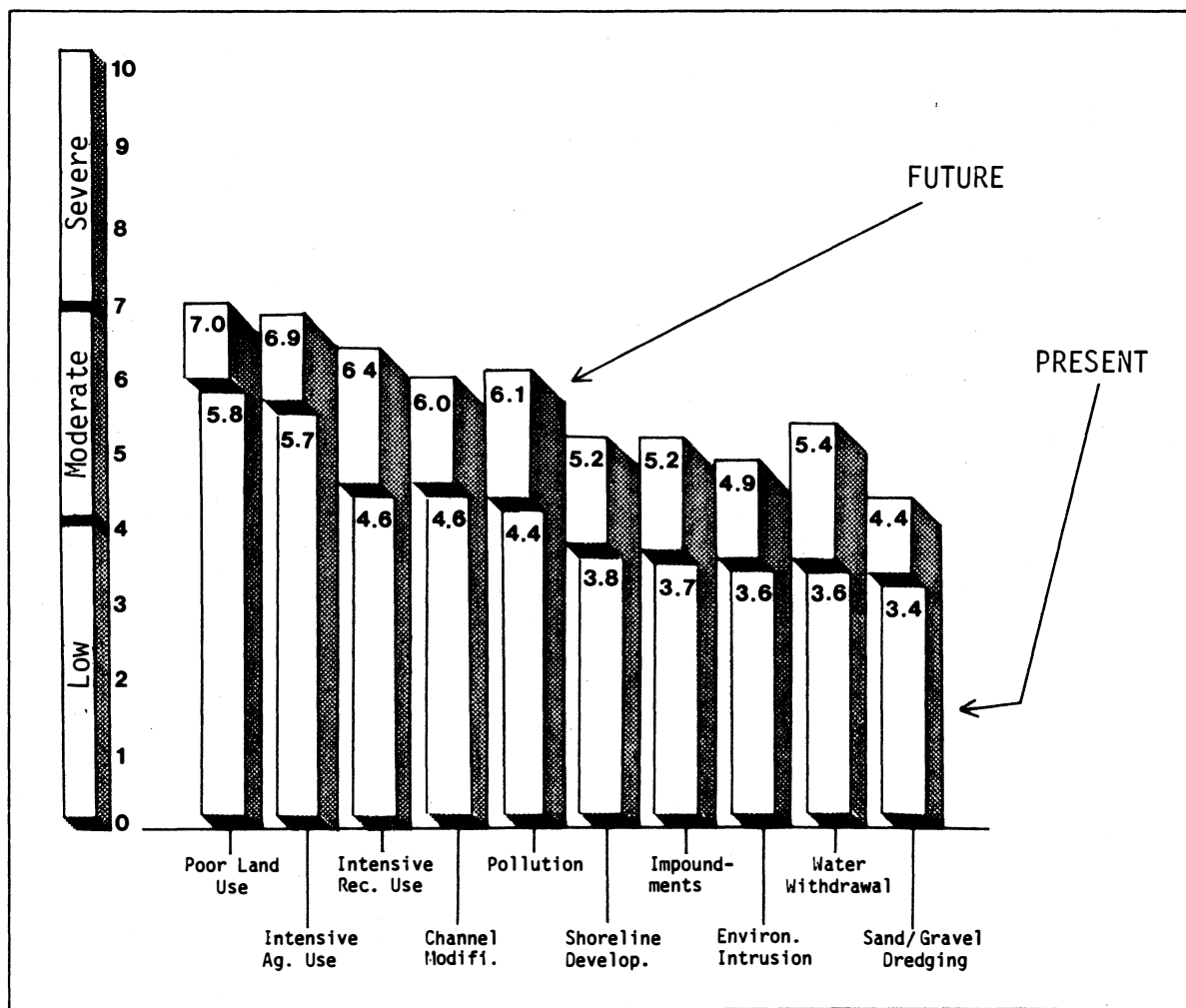
SUMMARY OF PROBLEMS LIMITING WATERSHED RECREATIONAL VALUES

Problem Category	Present		Future	
	Score (1-10)	Rank	Score (1-10)	Rank
Poor Land Use	5.8	1	7.0	1
Intensive Agricultural Use	5.7	2	6.9	2
Intensive Recreational Use	4.6	3.5	6.4	3
Channel Modification	4.6	3.5	6.0	5
Pollution	4.4	5	6.1	4
Bank & Shoreline Development	3.8	6	5.2	7.5
Impoundments	3.7	7	5.2	7.5
Environmental Intrusions	3.6	8.5	4.9	9
Water Withdrawals	3.6	8.5	5.4	6
Sand and Gravel Dredging	3.4	10	4.4	10

An examination of problem categories from watersheds of similar recreational value shows a degree of uniformity. This relationship was examined by dividing the 38 watersheds into approximate quartiles. Table 7 (see page 15) shows this common relationship now and in the future. Poor Land Use is and will be a highly ranked problem for all classes of watersheds. Pollution and Intensive Agricultural Use are also common problems to all classes of watersheds. However, Intensive Agricultural Use is a higher-ranked problem in the third and fourth quartiles, which indicates a cause-and-effect situation in these watersheds.

Figure 4

MEAN CHANGE IN SEVERITY OF PROBLEM CATEGORIES, PRESENT TO FUTURE



Intensive Recreational Use is a highly ranked problem for the first and second quartiles. Bank or Shoreline Development problems are principally associated with the first quartile, while Channel Modification and Water Withdrawals are associated with the last two quartiles. Water Impoundments are of concern primarily to the second quartile. It should be noted that mean scores increase with recreational rank order.

Table 7

TOP FIVE PROBLEM CATEGORIES
RANKED BY QUARTILE AND COMPARED PRESENT TO FUTURE

Problem Category	Rank of Recreational Values over (Mean Score Values)							
	1st Quart.		2nd Quart.		3rd Quart.		4th Quart.	
	Pres.	Fut.	Pres.	Fut.	Pres.	Fut.	Pres.	Fut.
Intensive Rec. Use	1 (6.0)	1 (7.9)	2 (5.3)	1 (7.2)	5 (4.0)	5 (6.0)		
Poor Land Use	2 (4.8)	3 (5.9)	1 (5.5)	2 (6.7)	2 (6.2)	2 (7.5)	1.5 (7.0)	2 (8.1)
Pollution	3 (4.6)	2 (6.2)	4 (5.1)	3 (6.6)	4 (4.3)	3 (6.3)	4.5 (3.5)	5 (4.8)
Intensive Ag. Use	4 (4.4)	5 (5.6)	3 (5.2)	4 (6.5)	1 (6.3)	1 (7.6)	1.5 (7.0)	1 (8.3)
Bank/Shoreline Devel.	5 (4.3)	4 (5.8)						
Channel Modification					3 (4.7)	4 (6.2)	3 (5.6)	3 (7.0)
Water Withdrawal							4.5 (3.5)	4 (5.3)
Impoundments			5 (4.6)	5 (6.4)				

DEPENDABILITY OF SURVEY EFFORT

A bivariate analysis was conducted to estimate the validity of the study results. Spearman Correlation Coefficients were used to measure the degree of similarity between the rank order of recreational watersheds and work done by Hanson, in which he ranked watersheds by the number of fishing trips they receive. The assumption made in the comparison is that as the number of fishing

trips increase, it is an indirect measure of the recreational value of a watershed. Also, it is assumed that fishing is a major recreational use of the watersheds listed in both studies.

The study proposition to be tested is that there will be a strong correlation between the rank order of the watersheds in the two studies. That is to say, a positive relationship will indicate that a high-ranked watershed in the Statewide Watershed Use Assessment will also be highly ranked in Hanson's work.

In 1977, Hanson surveyed the fishing pressure on 36 of the 38 watersheds included in the Regional Watershed Assessment. He estimated the number of fishing trips for each watershed by surveying approximately one in 25 resident and non-resident buyers of Missouri fishing permits. Hanson's watersheds were ranked on the basis of fishing trips and correlated with the three rankings shown in Table 8 (see page 17).

Spearman Correlation Coefficients were calculated to test the similarity of findings (an expression of validity). A comparison of the rank order of watersheds by cumulative index to fishing trips resulted in $r=0.74$. In comparing recreational value rank order to fishing trips, $r=0.68$. The rank order of present worth to Fishing trips resulted in $r=0.70$.

Two out of the three comparisons resulted in a significant correlation coefficient, implying acceptance of the study proposition. An analysis of the results revealed that the Jacks Fork, Eleven Point, Spring, and Headwaters Division account for most of the variability in the correlation. In some cases, these may represent streams receiving heavy recreational usage other than fishing.

Table 8

COMPARISON OF RANKING BY THE STATEWIDE WATERSHED USE ASSESSMENT AND HANSON

Watershed	Cumulative Index	Rec. Value	Present Worth	*Fishing Pressure No. Trips	Rank
Current River	6	1	1	237,766	5
Meramec River	8	3	2	332,224	1
Eleven Point River	13	4	3	37,487	24
Gasconade River	16	7	4	199,810	6
Mississippi River, Upper	16	6	8	323,272	3
Jacks Fork River	17	2	5	15,711	31
Missouri River	22	15	6	276,674	4
Big Piney River	27	13	7	104,379	12
Osage River, Eastern	35	16	8	147,925	8
Niangua River	36	8	9	329,152	2
St. Francis River	38	14	13	88,518	15
White River	40	12	11	164,956	7
Big River	41	5	18	86,304	17
White River, North Fork	42.5	9.5	12	50,485	23
Osage River, Western	46.5	9.5	21	112,090	10
Grand River	47	23	16	89,758	14
Black River	49	11	14	108,909	11
James River	52	21	17	124,412	9
Salt River	53	22	19	83,616	18
Pomme de Terre River	54	17	15	30,715	28
Platte River	57	20	22	87,227	16
Bourbeuse River	61	18	20	103,135	13
Sac River	67.5	24.5	23	61,191	20
Chariton River	68	30	25	26,040	30
Elk River	72	19	24	36,661	25
South Grand River	76.5	24.5	27	50,845	22
Lamine River	85	27	30	34,376	27
Blackwater River	87	31	26	29,744	29
Cuivre River	87	29	32	36,441	26
Spring River	87	28	28	75,074	19
Nodaway River	88	32	29	7,510	34
Thompson River	98	35	31	6,877	35
Fabius River	99	33	33	11,403	32
Headwaters Diversion	100	26	38	58,154	21
Moreau River	103	34	35	--	--
North River	106.5	37.5	34	10,173	33
Fox River	110.5	37.5	36	3,295	36
Wyaconda	111	36	37	--	--

* Source, 1980 Statewide Watershed Fishing Pressure Survey.

Spearman Correlation Coefficients: Cumulative Index / Fishing Trips = 0.74
 Recreational Value / Fishing Trips = 0.68
 Present Worth / Fishing Trips = 0.70

DISCUSSION / RECOMMENDATIONS

This study analyzed the professional opinions of resource managers who are familiar with the recreational value of Missouri's river watersheds. The technique used is an efficient means of collecting and interpreting the data. However, this study should be repeated in the future to clarify respondents' opinions. In future studies, watersheds should be subdivided to clarify resource differences within each watershed. It would also be of interest to identify the role which name-recognition may have had in selecting the ten most important recreational watersheds. The groups surveyed could also be expanded to include additional agencies and the general public.

One of the most revealing findings was that, on the average, respondents believe that there are no streams in the low recreational value category. In each part of the state, there are rivers that have a moderate to high recreational value for the people living there. Protection of the public's recreational interest cannot overlook any of the state's watersheds. It also appears that a decline in the value of some of today's top recreational streams is anticipated.

Policy-makers must be prepared to address a wide range of problem categories now and in the future. Many of the complex problems limiting recreational use of watersheds can only be resolved in small increments. Interviewees said that Poor Land Use was the principal challenge facing the state's policy-makers. In subsequent surveys, the ambiguous term "Poor Land Use" needs to be better defined to help focus land-use policies. Pollution from agricultural practices and erosion were often associated with poor land use. Solutions to these problems may involve compromises between private and public interests.

Potential solutions to the problems examined in this study have recently been addressed in Missouri. Both the Resources Conservation Act (RCA) Assessment, conducted by the Soil Conservation Service, and the Statewide Comprehensive Outdoor Recreation Plan (SCORP), completed by the Department of Natural Resources, had extensive input from the public and governmental agencies. The findings of these agencies should be a valuable aid to the Regional Watershed Assessment Task Force in recommending a viable statewide action plan.

Potential solutions presented in the RCA and SCORP indicate a growing awareness of the need for soil and water conservation, improved water quality, and protected instream flows. Recreational interests are an integral part of these issues and should contribute to the solutions society will be seeking. Since potential solutions will be tested against economic tradeoffs, the recreational value of watersheds should be documented in economic terms.

The Regional Watershed Assessment Plan should support the ongoing efforts of agencies to improve soil and water conditions and, where possible, strengthen their legislative mandates. A statute protecting the public's interest in riparian lands and stream channels also is needed. A final aspect of water quality affecting the recreational value of rivers is instream flows. Protection of sufficient instream flows is needed for recreation, fish and wildlife uses.

The SCORP shows that the public is concerned about overcrowding on certain Ozark streams; other rivers receive comparatively little use. The present study shows these concerns are shared by Missouri's professional resource managers. They indicated which streams they feel will become important as use patterns shift due to overcrowding and development. In order to lessen the crowding on Ozark streams, a coordinated effort should promote the recreation potential of the highly ranked but lesser-used streams identified by this study. Both public and commercial interests should be encouraged to develop recreational services on these streams. In addition, the recreational potential of the state's largest rivers, the Missouri and the Mississippi, should be actively promoted.

Respondents to this survey indicated a trend toward heavier usage of urban watersheds in the future. The public responding to the statewide recreation plan also indicated a similar trend. Priorities, therefore, should emphasize projects which encourage recreational access to urban waterfront areas.

Finally, the Regional Watershed Assessment Plan should be used as a mechanism to inform the public of the facts concerning water use in Missouri. Major findings should be summarized in a popular form and presented to the public. This is vital if the public is expected to make informed decisions about how water resources are to be used in the future.

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ALPHABETICAL LISTING OF WATERSHEDS

<u>Map Code</u>	<u>Watershed</u>	<u>Map Code</u>	<u>Watershed</u>
1	Big River	35	Mississippi River, Upper
2	Big Piney River	20	Missouri River
3	Black River	21	Moreau River
4	Blackwater River	22	Niangua River
5	Bourbeuse River	23	Nodaway River
6	Chariton River	24	North River
7	Cuivre River	26	Osage River, Eastern
8	Current River	38	Osage River, Western
9	Eleven Point River	27	Platte River
10	Elk River	28	Pomme de Terre River
11	Fabius River	29	Sac River
12	Fox River	30	St. Francis River
13	Gasconade River	31	Salt River
14	Grand River	32	South Grand River
15	Headwater Diversion	33	Spring River
16	Jacks Fork River	34	Thompson River
17	James River	36	White River
18	Lamine River	25	White River, North Fork
19	Meramec River	37	Wyaconda River

NUMERIC LISTING OF WATERSHEDS

<u>Map Code</u>	<u>Watershed</u>	<u>Map Code</u>	<u>Watershed</u>
1	Big River	20	Missouri River
2	Big Piney River	21	Moreau River
3	Black River	22	Niangua River
4	Blackwater River	23	Nodaway River
5	Bourbeuse River	24	North River
6	Chariton River	25	White River, North Fork
7	Cuivre River	26	Osage River, Eastern
8	Current River	27	Platte River
9	Eleven Point River	28	Pomme de Terre River
10	Elk River	29	Sac River
11	Fabius River	30	St. Francis River
12	Fox River	31	Salt River
13	Gasconade River	32	South Grand River
14	Grand River	33	Spring River
15	Headwater Diversion	34	Thompson River
16	Jacks Fork River	35	Mississippi River, Upper
17	James River	36	White River
18	Lamine River	37	Wyaconda River
19	Meramec River	38	Osage River, Western

LETTER OF TRANSMITTAL FOR QUESTIONNAIRES

Good Day:

The Department of Natural Resources and Department of Conservation are in the process of developing a Regional Watershed Assessment (RWA) for Missouri. An attempt is being made to identify problems, issues and possible solutions within each watershed. A variety of issues are being addressed in the assessment in order to guide future policy decisions and foster coordination between the various agencies and departments with water related responsibilities.

The Division of Parks and Historic Preservation of the Department of Natural Resources is involved in the RWA as it relates to recreation. One approach we are taking is to ask you to provide insight gained from your familiarity with the resource. The two questionnaires involved were developed by the Missouri Department of Conservation. They will take only a few minutes to complete and will be a valuable contribution.

Depending upon your area of responsibility, several copies of one of these questionnaires may be sent to you for completion. One assesses the recreation value of the major watersheds of the state. The rest will be provided with the assumption that you are familiar with the specific watershed in question.

If you feel unqualified to rank any watershed assigned to you, simply draw a line through your name and return each form to this office. Be sure you look at the heading of each questionnaire and mentally review the watershed's problems before marking the rating scale.

For the purposes of these questionnaires, the following definitions apply:

Recreation: Any leisure time activity enhanced by the presence of water or which is water related. Work on determining river oriented recreational usage has documented activities that ranged from obvious (fishing, swimming, etc.) to the not so obvious (picnicking, nature study, sightseeing, gathering products, etc.). Consider any recreational use you might find on or along a stream or tributary. Recreational use of reservoirs or other artificial water bodies is not a part of this survey.

Problem: Any factor that limits or detracts from the recreational experience or reduces the ability of the resource to support recreation uses.

Please return your questionnaires by April 23, 1982. Thanks for your cooperation.

Sincerely,

PROBLEM QUESTIONNAIRE

WATERSHED _____

RATER'S NAME _____

AGENCY _____

1. First, rate the recreational value of this watershed by circling a number from 1-10, where 1 is no value and 10 is extremely valuable. 1 2 3 4 5 6 7 8 9 10
2. Second, please assess the PRESENT importance of each of the following problems for the recreational use of these waters, AND then the FUTURE importance of each problem by the year 2000 assuming no control of the problem. Circle a number on each scale to show the importance of the problem, where 1 is not important and 10 is extremely important.
- | | PRESENT | FUTURE |
|---|----------------------|----------------------|
| A. Pollution from municipal and/or industrial sources. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| B. Bank or shoreline development associated with cabins, second homes, etc. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| C. "Environmental intrusions" such as power lines, pipelines, highways, etc. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| D. Intensive recreational use, i.e. overcrowding, litter, etc. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| E. Intensive agricultural use, i.e. grazing of river sides, cattle in stream, farming to the river's edge, etc. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| F. Water withdrawals for irrigation, municipal, industrial or domestic water supply. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| G. Channel modification by either private or government interests including indirect upstream and downstream effects. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| H. Impoundments - including upstream and downstream indirect effects such as regulated flows, unstable banks, etc. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| I. Poor land use--past and/or present--includes rapid runoff, graveled stream channels, turbid water, etc. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| J. Sand and gravel dredging and extraction. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| K. Other - define. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |
| L. Other - define. | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 |

Appendix 4

MOST IMPORTANT WATERSHED QUESTIONNAIRE

Rater's Name _____ Agency _____

The following watersheds are the categories being considered in the development of a State Water Plan. Please select the ten which you consider currently important or significant as recreational resources. Next rank these ten in order of importance with most important first and least important tenth. Then, list the ten watersheds that could be important by the year 2000 if all present problems were removed or solved. Last rank these future 10 in order of potential importance.

Western Osage, Sac, Pomme de Terre, Chariton, Salt, Elk, Spring, James, Gasconade, Big Piney, Little Piney, Eastern Osage, Niangua, Fabius, Fox, Wyaconda, North, Cuivre, Big, Meramec, Bourbeuse, Headwaters Diversion, St. Francis, Black, Grand, Nodaway, Platte, Thompson, Missouri, Upper Mississippi, Current, Eleven Point, Jacks Fork, North Fork White, White, Blackwater, Lamine, Moreau, South Grand.

<u>Currently Important</u>	<u>Ranked in Order of Importance</u>	<u>Future Important</u>	<u>Ranked in Order of Importance</u>
1.	1	1	1
2.	2.	2.	2.
3.	3.	3.	3.
4.	4.	4.	4.
5.	5.	5.	5.
6.	6.	6.	6.
7.	7.	7.	7.
8.	8.	8.	8.
9.	9.	9.	9.
10.	10.	10.	10.

Appendix 5

PRESENT (P) AND FUTURE (F) WATERSHED PROBLEM SCORES RANKED BY QUANTILES OF RECREATIONAL VALUE

(RANK BASED ON CUMULATIVE INDEX VALUES)

First Quartile Watersheds	Pollution		Shoreline Develop.		Environ. Intrusion		Intensive Rec. Use		Intensive Ag. Use		Water Withdrawal		Channel Modifi.		Impoundments		Poor Land Use		Sand/Gravel Dredging	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
Current River	3.1	4.9	3.5	4.5	3.1	4.2	7.6	9.1	2.6	3.5	2.1	3.0	2.1	3.1	1.6	2.5	2.9	3.5	3.5	4.2
Meramec River	5.8	7.9	6.4	8.3	4.8	6.1	7.5	9.4	4.8	6.3	3.8	6.5	4.1	5.8	3.2	6.3	5.3	6.9	5.9	7.5
Eleven Point River	2.7	4.2	3.3	4.5	3.4	5.0	6.7	8.9	3.9	5.5	2.1	3.3	2.2	3.4	1.7	2.7	3.8	4.3	3.9	5.2
Gasconade River	4.5	6.2	4.7	6.7	3.9	5.4	5.3	7.6	5.4	6.8	3.3	5.5	2.5	3.9	1.7	3.1	4.9	6.5	3.7	4.9
Miss. River, Upper	6.9	8.4	4.8	6.1	4.9	6.0	4.8	6.6	4.5	5.4	4.4	6.2	6.9	8.3	5.7	6.7	6.6	7.6	4.8	5.6
Jacks Fork River	1.8	3.9	3.1	3.7	2.9	4.2	7.0	9.1	2.5	3.1	2.0	2.6	2.2	3.3	1.5	2.3	3.3	3.9	2.9	4.0
Missouri River	7.3	8.5	3.7	4.8	4.3	5.2	4.0	5.9	5.8	6.7	5.4	8.0	8.3	8.9	5.0	6.2	7.0	7.9	5.2	6.1
Big Piney River	6.2	7.4	4.0	5.9	4.0	5.1	5.1	7.1	4.5	5.8	3.0	4.4	2.9	4.2	2.3	3.8	4.3	5.6	4.3	5.2
Osage, Eastern	4.1	5.8	5.4	6.9	3.8	4.7	5.2	6.9	5.1	6.0	3.9	5.0	4.7	5.7	6.6	7.2	5.2	6.1	3.8	4.5
Niangua River	3.3	5.3	4.2	6.2	3.7	5.1	6.7	8.6	5.3	6.7	2.8	4.2	3.1	4.5	3.9	4.7	4.7	6.4	3.9	5.1
Subtotal	45.7	62.5	43.1	57.6	38.8	51.0	59.9	79.2	44.4	55.8	32.8	48.7	39.0	51.1	33.2	45.5	48.0	58.7	41.9	52.3
Average	4.6	6.2	4.3	5.8	3.9	5.1	6.0	7.9	4.4	5.6	3.3	4.9	3.9	5.1	3.3	4.5	4.8	5.9	4.2	5.2
Rank	3	2	5	4	1	1	1	1	4	5	9.5	9	7.5	7.5	9.5	10	2	3	6	6

Second Quartile Watersheds	Pollution		Shoreline Develop.		Environ. Intrusion		Intensive Rec. Use		Intensive Ag. Use		Water Withdrawal		Channel Modifi.		Impoundments		Poor Land Use		Sand/Gravel Dredging	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
St. Francis River	4.5	6.4	4.0	5.9	3.5	4.9	4.8	6.5	5.5	6.8	4.0	5.3	5.0	6.2	4.7	5.8	5.1	6.4	2.8	4.0
White River	4.8	7.0	5.5	7.5	4.1	5.8	6.5	8.3	3.2	5.0	3.3	5.1	3.2	5.1	5.5	7.1	4.1	5.7	3.9	5.4
Big River	8.3	9.1	6.5	8.2	4.9	6.3	7.1	9.0	5.4	6.7	3.5	5.7	2.9	5.2	3.4	7.1	6.2	7.5	4.8	6.8
White, North Fork	2.3	3.2	4.5	6.3	3.4	4.9	6.5	8.2	3.7	5.6	2.1	3.0	2.2	3.3	2.2	3.4	4.0	5.2	3.2	4.5
Osage, Western	4.7	6.3	3.9	5.5	3.6	4.9	4.8	7.3	5.5	6.5	4.1	5.7	5.3	6.0	6.6	7.9	6.5	7.6	2.6	3.5
Grand River	4.4	5.8	2.6	3.7	3.5	4.3	3.4	4.9	7.2	8.3	4.7	6.6	6.8	7.6	3.5	5.2	7.4	8.4	3.5	4.5
Black River	5.3	6.8	4.8	7.0	4.2	5.9	6.2	8.0	5.6	6.7	3.7	5.5	4.3	6.6	5.4	6.6	5.3	6.7	5.8	7.2
James River	7.8	9.0	5.1	7.5	4.1	6.1	5.4	7.5	4.7	5.9	5.2	7.5	3.1	4.9	4.1	6.9	4.4	5.9	3.1	4.7
Salt River	5.3	7.1	3.3	5.7	4.1	5.5	5.2	6.1	7.3	8.3	4.3	6.2	5.3	7.3	4.7	7.3	7.3	8.2	3.0	4.4
Pomme de Terre	3.4	5.0	4.4	6.0	3.7	5.4	5.0	6.6	4.4	5.7	3.1	4.9	3.8	5.2	5.5	6.8	4.7	5.9	3.1	4.2
Subtotal	50.8	65.7	44.6	63.3	39.1	54.0	52.9	72.4	52.5	65.5	38.0	55.5	41.9	57.4	45.6	64.1	55.0	67.5	35.8	49.2
Average	5.1	6.6	4.5	6.3	3.9	5.4	5.3	7.2	5.2	6.5	3.8	5.5	4.2	5.7	4.6	6.4	5.5	6.7	3.6	4.9
Rank	4	3	6	6	8	9	2	1	3	4	9	8	7	7	5	5	1	2	10	10

Appendix 5 (continued)

Third Quartile Watersheds	Pollution		Shoreline Develop.		Environ. Intrusion		Intensive Rec. Use		Intensive Ag. Use		Water Withdrawal		Channel Modifi.		Impoundments		Poor Land Use		Sand/Gravel Dredging	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
Platte River	3.7	6.2	2.8	4.3	3.0	4.1	4.3	6.1	7.4	8.4	3.9	6.3	6.3	7.3	3.8	5.2	7.4	8.4	2.3	3.7
Bourbeuse River	4.0	6.0	4.8	6.6	3.8	5.2	4.8	6.7	6.0	7.5	3.2	5.2	3.1	5.0	2.3	5.3	4.9	6.4	3.8	5.0
Sac River	4.3	6.5	3.2	4.8	4.1	5.6	4.2	6.4	5.7	7.0	3.7	5.7	4.5	5.9	6.0	6.7	5.7	6.7	3.0	3.9
Chariton River	3.9	5.8	3.0	3.8	3.1	4.2	3.2	5.0	6.8	7.9	3.9	5.8	7.9	8.8	6.2	7.2	7.4	8.4	3.0	4.0
Elk River	3.8	6.7	4.6	7.1	3.4	5.4	5.4	7.9	4.8	6.4	3.2	6.1	2.8	4.9	2.5	5.3	4.8	6.7	4.8	6.2
South Grand River	4.8	6.5	3.3	4.5	4.1	4.9	4.2	6.1	6.9	7.7	4.8	6.2	6.1	6.8	5.6	6.5	7.2	8.1	2.6	3.0
Lamine River	4.0	5.5	3.6	4.5	3.2	4.0	3.2	4.8	6.3	7.6	3.8	5.2	4.3	5.8	3.1	3.9	6.6	7.6	2.8	3.5
Blackwater	5.4	7.1	2.9	4.0	3.4	4.4	3.5	4.9	6.7	7.9	4.9	7.0	5.9	7.2	2.8	4.1	7.1	8.2	2.1	2.7
Cuivre River	3.8	5.4	3.5	5.6	4.0	5.1	3.4	5.9	7.1	8.0	3.0	4.8	3.6	5.8	2.7	4.5	6.7	8.2	2.9	4.0
Spring River	5.6	7.8	2.8	4.4	3.6	4.8	3.6	5.8	5.8	7.3	4.4	7.0	2.8	4.9	2.5	5.0	4.7	6.2	2.6	4.1
Subtotal	43.3	63.5	34.5	49.6	35.7	47.7	39.8	59.6	63.5	75.7	38.8	59.3	47.3	62.4	37.5	53.7	62.5	74.9	29.9	40.1
Average	4.3	6.3	3.4	5.0	3.6	4.8	4.0	6.0	6.3	7.6	3.9	5.9	4.7	6.2	3.7	5.4	6.2	7.5	3.0	4.0
Rank	4	3	9	8	8	9	5	5	1	1	6	6	3	4	7	7	2	2	10	10

Fourth Quartile Watersheds	Pollution		Shoreline Develop.		Environ. Intrusion		Intensive Rec. Use		Intensive Ag. Use		Water Withdrawal		Channel Modifi.		Impoundments		Poor Land Use		Sand/Gravel Dredging	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
Nodaway River	4.5	5.8	3.2	4.2	3.3	3.9	3.1	4.5	7.2	8.3	4.6	6.6	6.6	7.6	3.3	4.9	7.2	8.5	2.7	3.6
Thompson River	3.7	5.3	1.9	2.6	3.2	4.4	2.7	4.3	8.1	8.9	4.4	7.1	6.9	7.8	4.2	5.1	8.1	9.1	3.6	4.9
Fabius River	3.4	4.8	2.3	3.7	3.5	4.4	2.7	4.1	7.1	8.6	3.1	5.0	5.6	7.2	3.5	4.4	7.1	8.7	2.3	3.2
Headwaters Div.	4.0	6.1	3.3	4.5	4.1	5.4	4.4	6.2	6.6	8.4	4.1	6.0	6.7	8.2	3.9	5.4	6.7	8.1	3.8	4.9
Moreau River	4.4	5.7	3.3	4.7	3.3	4.7	3.2	4.9	6.8	8.0	3.0	4.2	3.9	5.2	2.2	3.5	6.7	7.4	2.7	3.2
North River	3.4	4.2	2.4	3.2	3.2	3.9	2.8	3.7	7.5	8.8	4.0	5.8	5.5	6.8	3.1	3.9	7.5	8.4	2.6	3.9
Fox River	2.4	3.1	2.5	3.0	2.3	3.0	2.2	3.2	6.9	7.9	2.1	3.4	5.2	7.0	2.3	3.0	6.9	7.8	1.6	1.9
Wyaconda River	2.4	3.6	2.2	3.0	2.5	3.1	2.0	3.1	6.1	7.2	2.5	4.0	4.6	6.1	2.5	3.3	5.8	7.0	1.5	2.1
Subtotal	28.2	38.6	21.1	28.9	22.4	32.8	23.1	34.0	56.3	66.1	27.8	42.1	45.0	55.9	25.0	33.5	56.0	65.0	20.8	27.7
Average	3.5	4.8	2.6	3.6	2.8	4.1	2.9	4.2	7.0	8.3	3.5	5.3	5.6	7.0	3.1	4.2	7.0	8.1	2.6	3.5
Rank	4.5	5	9.5	9	8	8	7	6.5	1.5	1	4.5	4	3	3	6	6.5	1.5	2	9.5	10

Appendix 5 (continued)

Statewide Total	Pollution		Shoreline Develop.		Environ. Intrusion		Intensive Rec. Use		Intensive Ag. Use		Water Withdrawal		Channel Modifi.		Impoundments		Poor Land Use		Sand/Gravel Dredging	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
First Quartile	45.7	63.5	43.1	57.6	38.8	51.0	59.9	79.2	44.4	55.8	32.8	48.7	39.0	51.1	33.2	45.5	48.0	58.7	41.9	52.3
Second Quartile	50.8	65.7	44.6	63.3	39.1	54.0	52.9	72.4	52.5	65.5	38.0	55.5	41.8	57.4	45.6	64.1	55.0	67.5	35.8	49.2
Third Quartile	43.3	63.5	34.5	49.6	35.7	47.7	39.8	59.6	63.5	75.7	38.8	59.3	47.3	62.4	37.5	53.7	62.5	74.9	29.9	40.1
Fourth Quartile	28.2	38.6	21.1	28.9	22.4	32.8	23.1	34.0	56.3	66.1	27.8	42.1	45.0	55.9	25.0	33.5	56.0	65.0	20.8	27.7
Grand Total	168.0	230.3	143.3	199.4	136.0	185.5	175.7	245.2	216.7	263.1	137.4	205.6	173.2	226.8	141.3	196.8	221.5	266.1	128.4	169.3
Average	4.4	6.1	3.8	5.2	3.6	4.9	4.6	6.4	5.7	6.9	3.6	5.4	4.6	6.0	3.7	5.2	5.8	7.0	3.4	4.4
Rank	5	4	6	7.5	8.5	9	3.5	3	2	2	8.5	6	3.5	5	7	7.5	1	1	10	10

Appendix 6

RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

This section presents a brief description of the recreational values and problems computed for each watershed (Tables 10 through 47). A comparison of the three rankings presented in Table 9, is frequently referred to in the narrative of Tables 10 through 47.

Table 9

RANKING OF MEAN RECREATIONAL VALUES, PRESENT AND FUTURE WORTH

Watershed	Mean Rec. Value		Ranking of Recreational Worth	
	Mean (1-10)	Rank	Present	Future
Current River	9.3	1	1	4
Jacks Fork River	9.2	2	5	10
Meramec River	9.2	3	2	3
Eleven Point River	8.9	4	3	6
Big River	8.4	5	18	18
Mississippi River	8.2	6	8	2
Gasconade River	8.2	7	4	5
Niangua River	8.1	8	9	19
White, North Fork	8.0	9.5	12	21
Osage River, Western	8.0	9.5	21	16
Black River	7.9	11	14	24
White River	7.6	12	11	17
Big Piney River	7.5	13	7	7
St. Francois River	7.5	14	13	11
Missouri River	7.3	15	6	1
Osage River, Eastern	7.3	16	10	9
Pomme de Terre River	7.1	17	15	22
Bourbeuse River	7.1	18	20	23
Elk River	6.9	19	24	29
Platte River	6.9	20	22	15
James River	6.5	21	17	14
Salt River	6.5	22	19	12
Grand River	6.5	23	16	8
Sac River	6.4	24.5	23	20
South Grand River	6.4	24.5	27	25
Headwaters Diversion	6.3	26	38	36
Lamine River	6.0	27	30	28
Spring River	5.7	28	28	31
Cuivre River	5.7	29	32	26
Chariton River	5.4	30	25	13

Table 9 (Continued)

RANKING OF MEAN RECREATIONAL VALUES, PRESENT AND FUTURE WORTH

Watershed	Mean Rec. Value		Ranking of Recreational Worth	
	Mean (1-10)	Rank	Present	Future
Blackwater River	5.0	31	26	30
Nodaway River	4.8	32	29	27
Fabius River	4.7	33	33	33
Moreau River	4.6	34	35	34
Thompson River	4.3	35	31	32
Wyaconda River	4.2	36	37	38
North River	4.0	37	34	35
Fox River	4.0	38	36	37

Recreation: The high Mean Recreational Value (8.4) ranks fifth among the 38 watersheds surveyed. However, a low Present Worth of 18 suggests that those who know the stream regard it highly, while little is known about it statewide. The Future Worth of the watershed is not expected to change.

Problems: Table 10 summarizes the respondents' opinions. Pollution, Intensive Recreation Use, and Bank or Shoreline Development are perceived as the top three problems now and in the future. Pollution and Intensive Recreational Use rank in the Severe category. All three problem categories are expected to be Severe in the future. The category of Water Impoundments is expected to gain four points in the future, raising it from the Low category into the Severe Category.

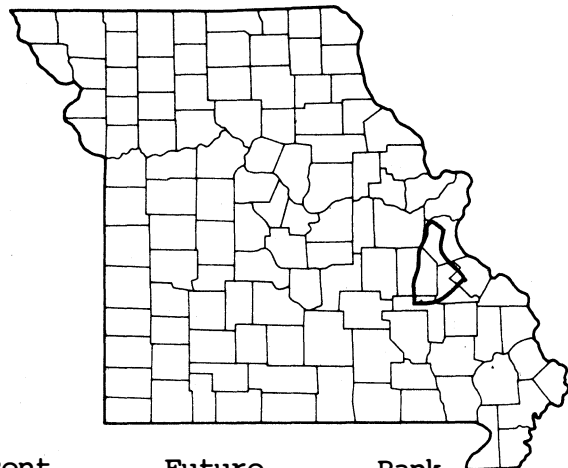
Discussion: The Corps of Engineers recently completed a series of public hearings which confirm that local citizens believe the stream to have a high recreational value. There also is concern over the problems caused by past and present mining activities. The lack of change between current and future problems may indicate a feeling that solving the watershed's heavy-metal and mining-waste problems is impossible. The concern for future Water Impoundments may reflect the recent debate over the proposed Pine Ford and Irondale Reservoir projects. Mineral Fork, a principal tributary has been listed on the Department of the Interior's Nationwide Rivers Inventory.

TABLE 10

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Big River
Number of Respondents: 28

Mean Rec. Value On A Scale Of 1-10 : 8.4
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 18
Future Worth : 18
Change In Rank, Present to Future : 0



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
A.	Pollution	1	8.3	1	9.1	0
D.	Intensive Recreational Use	2	7.1	2	9.0	0
B.	Bank or Shoreline Development	3	6.5	3	8.2	0
I.	Poor Land Use	4	6.2	4	7.5	0
E.	Intensive Agricultural Use	5	5.4	7	6.7	-2
C.	Environmental Intrusions	6	4.9	8	6.3	-2
J.	Sand and Gravel Dredging	7	4.8	6	6.8	+1
F.	Water Withdrawals	8	3.5	9	5.7	-1
H.	Water Impoundments	9	3.4	5	7.1	+4
G.	Channel Modification	10	2.9	10	5.2	0

Recreation: The Big Piney River is a High Value stream with a Mean Recreational Value of 7.5. Respondents ranked the stream 7th in both Present and Future Recreational Rank. The lack of change in this high ranking and its high Mean Recreational Value (ranked 13th statewide) indicates this is a valuable Missouri recreational resource.

Problems: Pollution is perceived as the chief factor currently limiting the river's recreational value. This problem category is expected to become Severe in the future and will remain the top-ranked problem. Intensive Recreational Use is ranked second now and in the future. Intensive Agricultural Use is ranked third but is expected to remain Moderate in severity. Bank and Shoreline Development is expected to become the third-ranked problem in the future.

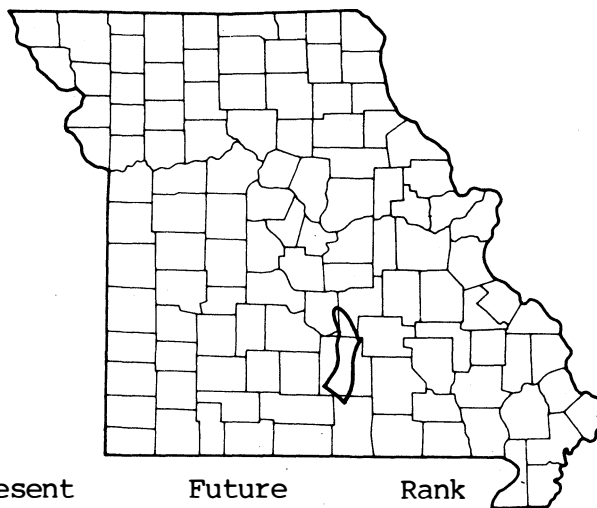
Discussion: The Little Piney and Big Piney were surveyed as separate entities but were analyzed as one watershed because only four questionnaires were returned for the Little Piney. Sand and Gravel Dredging and Intensive Agricultural Use are the Little Piney's principal problems. The sustained high Recreational Rank indicates that the Big Piney is a valuable state recreational resource. The Big Piney has been included in the Department of Interior's Nationwide Rivers Inventory. Although this well-known Ozark stream is as removed from major urban centers as the Current River, apparently respondents feel that it will not suffer from overuse in the future.

TABLE 11

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Big Piney River
Number of Respondents: 27

Mean Rec. Value On A Scale Of 1-10 : 7.5
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 7
Future Worth : 7
Change In Rank, Present to Future : 0



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
A.	Pollution	1	6.2	1	7.4	0
D.	Intensive Recreational Use	2	5.1	2	7.1	0
E.	Intensive Agricultural Use	3	4.5	4	5.8	-1
J.	Sand and Gravel Dredging	4	4.3	6	5.2	-2
I.	Poor Land Use	5	4.3	5	5.6	0
C.	Environmental Intrusions	6	4.0	7	5.1	-1
B.	Bank or Shoreline Development	7	4.0	3	5.9	+4
F.	Water Withdrawals	8	3.0	8	4.4	0
G.	Channel Modification	9	2.9	9	4.2	0
H.	Water Impoundments	10	2.3	10	3.8	0

Recreation: The Mean Recreational Value of the watershed ranks in the High category (7.9). Its Future Worth is perceived as falling 10 points (14th to 24th), a significant drop.

Problems: Intensive Recreational Use, Sand and Gravel Dredging, and Intensive Agricultural Use are currently the three top problems. Each ranks in the Moderate category. The first two are expected to move into the Severe category in the future while Bank or Shoreline Development will become the third most important. All future problem categories are expected to gain in mean value.

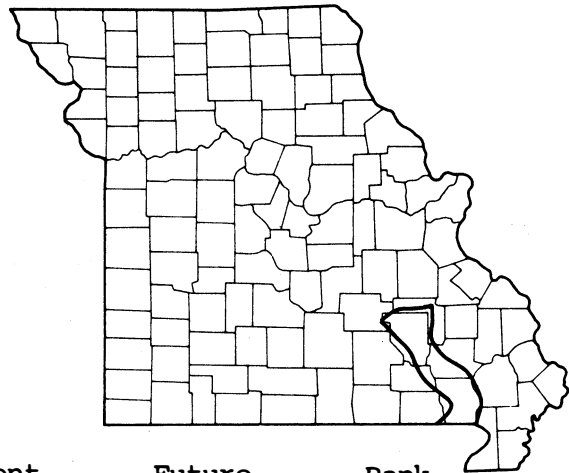
Discussion: This is a diverse watershed. Its headwater is a high-gradient Ozark stream, while below Poplar Bluff it becomes a lowlands river. Clearwater Reservoir in the mid-reach presents problems that are perceived as becoming less important in the future. Several respondents listed driving off-road vehicles in the river's upper channel as a present and future problem. While Pollution is ranked as a moderate problem, the study was not able to determine if respondents are aware of the newly discovered heavy-metal contamination in this system. The big drop in Future Worth may reflect a perceived inability to curb these problems in the future. An upstream reach from Highway K to the source has been included in the Department of the Interior's Nationwide Rivers Inventory.

TABLE 12

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Black River
Number of Respondents: 22

Mean Rec. Value On A Scale Of 1-10 : 7.9
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 14
Future Worth : 24
Change In Rank, Present to Future : -10



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	6.2	1	8.0	0
J.	Sand and Gravel Dredging	2	5.8	2	7.2	0
E.	Intensive Agricultural Use	3	5.6	5.5	6.7	-2.5
H.	Water Impoundments	4	5.4	7	6.6	-3
A.	Pollution	5	5.3	4	6.8	+1
I.	Poor Land Use	6	5.3	5.5	6.7	+0.5
B.	Bank or Shoreline Development	7	4.8	3	7.0	+4
G.	Channel Modification	8	4.3	8	6.6	0
C.	Environmental Intrusions	9	4.2	9	5.9	0
F.	Water Withdrawals	10	3.7	10	5.5	0

Recreation: The Mean Recreational Value of the Blackwater River is in the Moderate category (5.0). The Future Worth of the watershed is expected to slip from its current statewide ranking of 26th to 30th.

Problems: The top three perceived problems for both the present and the future are Poor Land Use, Intensive Agricultural Use, and Channel Modification. Poor Land Use currently ranks in the Severe category. All three will become Severe in the future. All problem categories are expected to gain in mean value in the future.

Discussion: The Blackwater River was channelized between 1908 and 1920. The channel instability created by this activity is evident today and, according to the majority of respondents, will continue into the future. The Poor Land Use and Intensive Agricultural Problems identified by the respondents were also documented by the Soil Conservation Service's River Basin Report of 1977. Further insights into the severity of these problems, as well as potential solutions, are also referenced in this report.

TABLE 13

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Blackwater River

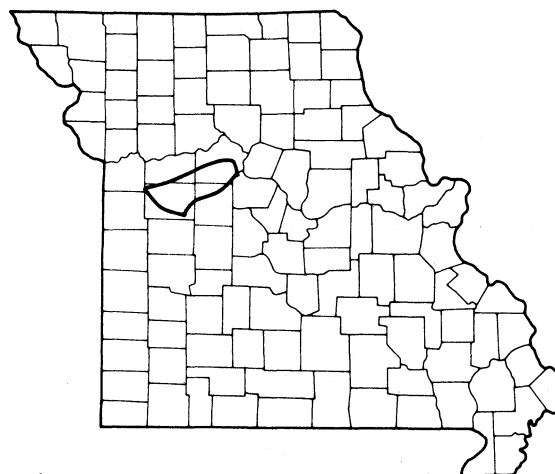
Number of Respondents: 28

Mean Rec. Value On A Scale Of 1-10 : 5.0

Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 26

Future Worth : 30

Change In Rank, Present to Future : -4



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
I.	Poor Land Use	1	7.1	1	8.2	0
E.	Intensive Agricultural Use	2	6.7	2	7.9	0
G.	Channel Modification	3	5.9	3	7.2	0
A.	Pollution	4	5.4	4	7.1	0
F.	Water Withdrawals	5	4.9	5	7.0	0
D.	Intensive Recreational Use	6	3.5	6	4.9	0
C.	Environmental Intrusions	7	3.4	7	4.4	0
B.	Bank or Shoreline Development	8	2.9	9	4.0	-1
H.	Water Impoundments	9	2.8	8	4.1	+1
J.	Sand and Gravel Dredging	10	2.1	10	2.7	0

Recreation: This High Value stream is presently ranked 20th in statewide importance among the 38 watersheds surveyed. However, this ranking is expected to drop slightly in the future. The high Mean Recreation Value (7.1) indicates a valuable resource that is not widely known but has good future recreation potential.

Problems: Intensive Agricultural Use and Poor Land Use are currently seen as the top two problems in the watershed. Each is ranked as Moderate in severity. Bank and Shoreline Development along with Intensive Recreational Use are tied for third place. Both are ranked in the Moderate category. In the future, all four are expected to remain among the watershed's chief problems, but Intensive Agricultural Use is expected to become Severe.

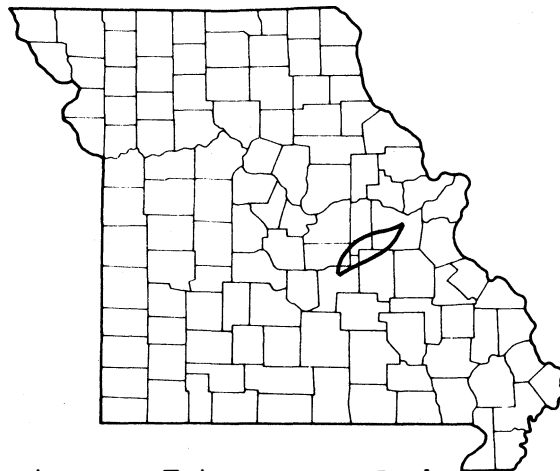
Discussion: The big change in the future ranking of Water Impoundments may be due to concern for the proposed Union and I-38 reservoir projects. Recent proposals for using the lower Bourbeuse to divert Missouri River water for municipal and industrial water supply in St. Louis and Jefferson counties may be a factor in this concern. The small spread of mean values between the future problem categories (5.3 to 7.5) suggests a perceived problem in maintaining the recreational value of the stream. The Bourbeuse River from Noser Mill upstream to Highway B has been included in the Department of the Interior's Nationwide Rivers Inventory.

TABLE 14

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Bourbeuse River
Number of Respondents: 26

Mean Rec. Value On A Scale Of 1-10 : 7.1
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 20
Future Worth : 23
Change In Rank, Present to Future : -3



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
E.	Intensive Agricultural Use	1	6.0	1	7.5	0
I.	Poor Land Use	2	4.9	4	6.4	-2
B.	Bank or Shoreline Development	3.5	4.8	3	6.6	+0.5
D.	Intensive Recreational Use	3.5	4.8	2	6.7	+1.5
A.	Pollution	5	4.0	5	6.0	0
C.	Environmental Intrusions	6	3.8	7.5	5.2	-1.5
J.	Sand or Gravel Dredging	7	3.8	9	5.0	-2
F.	Water Withdrawals	8	3.2	7.5	5.2	+0.5
G.	Channel Modification	9	3.1	10	5.0	-1
H.	Water Impoundments	10	2.3	6	5.3	+4

Recreation: The Mean Recreational Value of the watershed is in the Moderate category (5.4). Present Worth is ranked as 25th among 38 watersheds. However, it is expected to show the biggest increase in Future Worth. Both Present and Future Worth are higher in statewide rank than the Mean Recreational Value. This suggests that they cannot be explained by intrinsic values alone.

Problems: According to respondents, Channel Modification, Poor Land Use and Intensive Agricultural Use are the chief problems facing recreational interests, now and in the future. Table 15 shows that two problems are currently ranked Severe, while in the future, four problems are expected to be Severe. In addition, all problem categories are anticipated to gain in magnitude.

Discussion: The future ranking of this large watershed as a recreational resource in the face of the problems listed raises questions on why large gains in recreational values are anticipated. Recent acquisitions by the Department of Conservation for river access and other public uses may explain part of the respondents' optimism.

TABLE 15

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Chariton River
Number of Respondents: 25

Mean Rec. Value On A Scale Of 1-10 : 5.4
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 25
Future Worth : 13
Change In Rank, Present to Future : +12



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
G.	Channel Modification	1	7.9	1	8.8	0
I.	Poor Land Use	2	7.4	2	8.4	0
E.	Intensive Agricultural Use	3	6.8	3	7.9	0
H.	Water Impoundments	4	6.2	4	7.2	0
A.	Pollution	5	3.9	6	5.8	-1
F.	Water Withdrawals	6	3.9	5	5.8	+1
D.	Intensive Recreational Use	7	3.2	7	5.0	0
C.	Environmental Intrusions	8	3.1	8	4.2	0
J.	Sand and Gravel Dredging	9	3.0	9	4.0	0
B.	Bank and Shoreline Development	10	3.0	10	3.8	0

Recreation: The future statewide rank of the Cuivre River watershed is anticipated to shift from 32nd to 26th, a gain of six points. This gain, plus the rating of seven out of ten problems in the low category makes this stream noteworthy as a recreational resource.

Problems: Major changes between the ranking of current and future problems indicates perceived shifts in watershed conditions. Respondents feel that Intensive Agricultural Use and Poor Land Use will continue to be the chief problems of the watershed. The problems associated with Intensive Recreational Use increase, which is consistent with the increase in future worth.

Discussion: The proximity of this stream to metropolitan St. Louis may suggest why respondents believe the watershed to have such a great potential for future recreational value. Controlling problems will greatly enhance the watershed's future recreational value to a major metropolitan area. The West Fork Cuivre River has been included on the Department of the Interior's Nationwide Rivers Inventory.

TABLE 16

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Cuivre River
Number of Respondents: 25

Mean Rec. Value On A Scale Of 1-10 : 5.7
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 32
Future Worth : 26
Change In Rank, Present to Future : +6



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
E.	Intensive Agricultural Use	1	7.1	2	8.0	-1
I.	Poor Land Use	2	6.7	1	8.2	+1
C.	Environmental Intrusions	3	4.0	7	5.1	-4
A.	Pollution	4	3.8	6	5.4	-2
G.	Channel Modification	5	3.6	4	5.8	+1
B.	Bank or Shoreline Development	6	3.5	5	5.6	+1
D.	Intensive Recreational Use	7	3.4	3	5.9	+4
F.	Water Withdrawals	8	3.0	8	4.8	0
J.	Sand and Gravel Dredging	9	2.9	10	4.0	-1
H.	Water Impoundments	10	2.7	9	4.5	+1

Recreation: The Mean Recreational Value of the watershed is ranked in the High category (9.3). A standard deviation of .94 and a variance of .89 indicates close agreement in assigning this stream the highest rating for Mean Recreational Value in the state.

Problems: Intensive Recreational Use currently is perceived as the chief problem of the watershed. While currently ranked in the Severe category (7.6), it is expected to reach 9.1 in the future. This should be of concern to recreational managers, as all other problems rank in the Low category. Bank or Shoreline Development, Sand and Gravel Dredging, Pollution, and Environmental Intrusions are expected to increase to the Moderate category in the future on portions of the river system outside of the Ozark National Scenic Riverway.

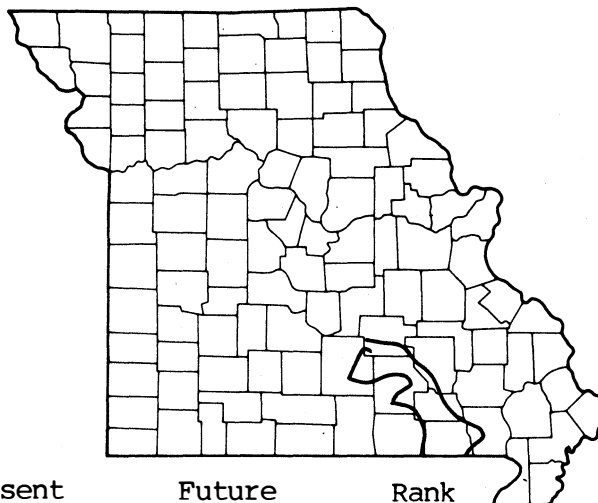
Discussion: The Current River may be a classic example of a stream which is being loved to death. Even if the current and future problems of the watershed can be overcome, this resource is expected to lose its top ranking (-3), sliding from first to fourth. This loss may be due to an expected increase in the recreational use of many of the major streams located near metropolitan areas. It may also indicate a pessimistic attitude toward the control of problems associated with Intensive Recreational Use.

TABLE 17

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Current River
Number of Respondents: 28

Mean Rec. Value On A Scale Of 1-10 : 9.3
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 1
Future Worth : 4
Change In Rank, Present to Future : -3



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	7.6	1	9.1	0
B.	Bank or Shoreline Development	2	3.5	3	4.5	-1
J.	Sand or Gravel Dredging	3	3.5	4.5	4.2	-1.5
A.	Pollution	4	3.1	2	4.9	+2
C.	Environmental Intrusions	5	3.1	4.5	4.2	+0.5
I.	Poor Land Use	6	2.9	6	3.5	0
E.	Intensive Agricultural Use	7	2.6	7	3.5	0
G.	Channel Modification	8	2.1	8	3.1	0
F.	Water Withdrawals	9	2.1	9	3.0	0
H.	Water Impoundments	10	1.6	10	2.5	0

Recreation: The watershed currently ranks third among the 38 watersheds surveyed. In spite of its high Mean Recreational Value of 8.9, the Eleven Point is expected to drop three points in Future Worth.

Problems: Respondents feel that Intensive Recreational Use is the major current problem (6.7), ranking in the Moderate category. All other present problems rank in the Low category. Respondents also feel that Intensive Recreational Use will move into the Severe category in the future, while outside the Eleven Point Scenic Riverway, six other problems will become Moderate in scope (Intensive Agricultural Use, Sand and Gravel Dredging, Environmental Intrusions, Bank and Shoreline Development, Poor Land Use, and Pollution).

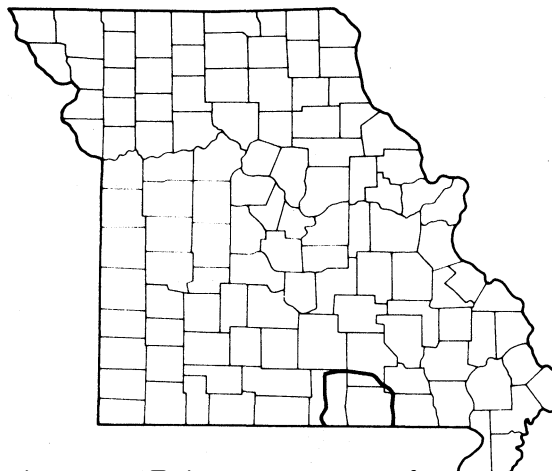
Discussion: The Eleven Point River, like the Current, may be an example of a recreationally over-used river. The anticipated increase in severity of several problem categories should be noted by recreational planners and managers. However, the high ranking of the Mean Recreational Value (4th statewide) suggests a substantial effort should be made to solve the perceived problems.

TABLE 18

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Eleven Point River
Number of Respondents: 19

Mean Rec. Value On A Scale Of 1-10 : 8.9
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 3
Future Worth : 6
Change In Rank, Present to Future : -3



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	<u>Change</u>
D.	Intensive Recreational Use	1	6.7	1	8.9	0
E.	Intensive Agricultural Use	2.5	3.9	2	5.5	+0.5
J.	Sand and Gravel Dredging	2.5	3.9	3	5.2	-0.5
I.	Poor Land Use	4	3.8	6	4.3	-2
C.	Environmental Intrusions	5	3.4	4	5.0	+1
B.	Bank or Shoreline Development	6	3.3	5	4.5	+1
A.	Pollution	7	2.7	7	4.2	0
G.	Channel Modification	8	2.2	8	3.4	0
F.	Water Withdrawals	9	2.1	9	3.3	0
H.	Water Impoundments	10	1.7	10	2.7	0

Recreation: The Mean Recreational Value of the watershed is in the Moderate category (6.9). The watershed's current ranking of 24th is expected to drop five points in the future (24th to 29th). The Mean Recreational Value ranks 19th, well above the Present and Future Worth ranking.

Problems: Intensive Recreational Use currently is the chief problem of the watershed. Its Moderate ranking is expected to move into the Severe category in the future in spite of what the respondents see as a shift in overall recreational rank. Poor Land Use and Intensive Agricultural Use currently are the second- and third-ranked problems. Bank and Shoreline problems are expected to become severe enough to be ranked second in the future, with Poor Land Use and Pollution tied for third.

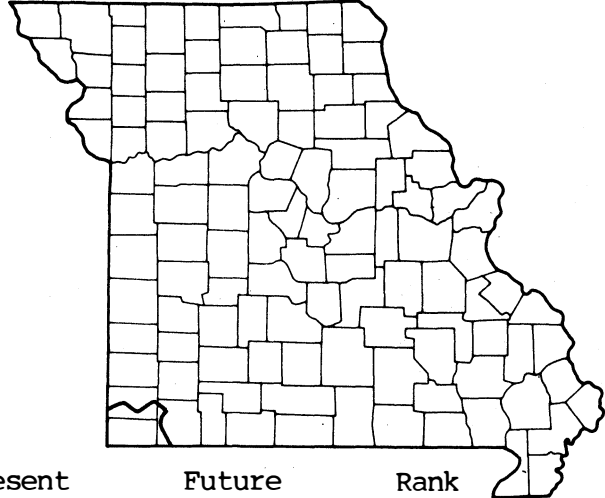
Discussion: The significant change in present to future rankings for most of the problem categories may indicate a watershed undergoing change. The relative standing of the watershed's Mean Recreational Value indicates a resource worthy of future problem-solving efforts.

TABLE 19

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Elk River
Number of Respondents: 13

Mean Rec. Value On A Scale Of 1-10 : 6.9
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 24
Future Worth : 29
Change In Rank, Present to Future : -5



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	5.4	1	7.9	0
I.	Poor Land Use	2	4.8	3.5	6.7	-1.5
E.	Intensive Agricultural Use	3	4.8	5	6.4	-2
J.	Sand and Gravel Dredging	4	4.8	6	6.2	-2
B.	Bank and Shoreline Development	5	4.6	2	7.1	+3
A.	Pollution	6	3.8	3.5	6.7	+2.5
C.	Environmental Intrusions	7	3.4	8	5.4	-1
F.	Water Withdrawals	8	3.2	7	6.1	+1
G.	Channel Modification	9	2.8	10	4.9	-1
H.	Water Impoundments	10	2.5	9	5.3	+1

Recreation: The Mean Recreational Value of the Fabius watershed is in the Low category (4.7). Its Future Worth is not expected to change (33rd out of 38 watersheds). A wide dispersion of Mean Recreational Value scores (1-8), a standard deviation of 2.5, and a variance of 6.3 indicate a diversity of opinion concerning this watershed. The ranking of the Mean Recreational Value is the same as the ranking of the Present and Future Worth. This supports the moderate standing of the watershed.

Problems: Table 11 indicates that respondents rated Poor Land Use, Intensive Agricultural Use, and Channel Modification as the chief problems, now and in the future. Poor Land Use and Intensive Agricultural Use are now ranked in the Severe category. Respondents expect all three to become Severe in the future. Water withdrawal will be a future problem of note.

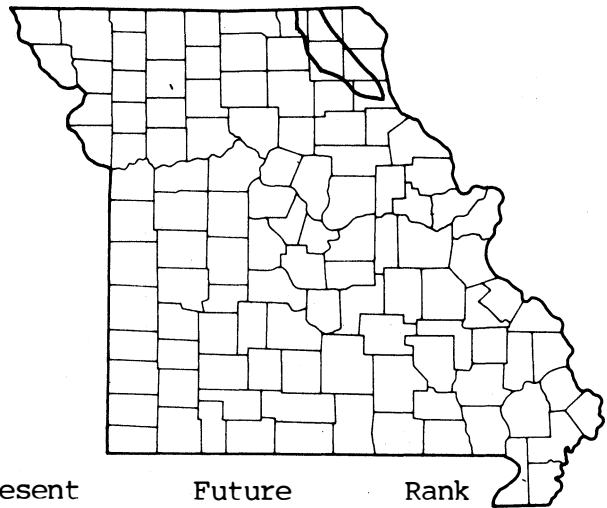
Discussion: The Fabius system is highly diverse in character, which led some respondents to comment that generating an overall mean value was a difficult, if not an impossible task. The wide dispersion in Mean Recreational Values is a good case in point. This diversity is also indicated by the Nationwide Rivers Inventory process which included portions of the Middle Fabius, North Fork, North Fabius, and South Fabius but not the entire system (Department of the Interior, 1981). The severe nature of the chief problems was recently quantified by a Soil Conservation Service Small Watershed (PL 566) study.

TABLE 20

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Fabius River
Number of Respondents: 21

Mean Rec. Value On A Scale Of 1-10 : 4.7
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 33
Future Worth : 33
Change In Rank, Present to Future : 0



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
I. Poor Land Use		1	7.1	1	8.7	0
E. Intensive Agricultural Use		2	7.1	2	8.6	0
G. Channel Modification		3	5.6	3	7.2	0
H. Water Impoundments		4	3.5	6	4.4	-2
C. Environmental Intrusions		5	3.5	7	4.4	-2
A. Pollution		6	3.4	5	4.8	+1
F. Water Withdrawals		7	3.1	4	5.0	+3
D. Intensive Recreational Use		8	2.7	8	4.1	0
B. Bank or Shoreline Development		9	2.3	9	3.7	0
J. Sand and Gravel Dredging		10	2.3	10	3.2	0

Recreation: The Fox River has a Moderate Mean Recreational Value and a relatively low standing among the state's watersheds (36th out of 38). This standing is expected to decrease slightly in the future (-1).

Problems: Intensive Agricultural Use, Poor Land Use, and Channel Modification constitute the principal problems, now and in the future. All three are expected to become Severe, but currently are ranked in the Moderate category. The remainder of the problems are ranked in the Low category.

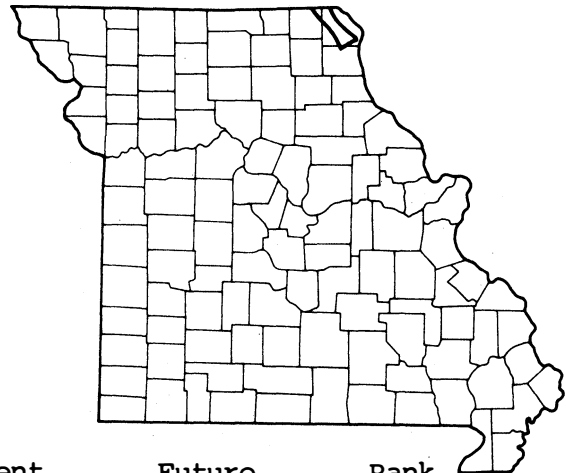
Discussion: The watershed is an example of a resource with a low statewide recreational standing, but of moderate value to local respondents. This illustrates the point that all of the state's waters have recreational value to someone.

TABLE 21

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Fox River
Number of Respondents: 10

Mean Rec. Value On A Scale Of 1-10 : 4.0
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 36
Future Worth : 37
Change In Rank, Present to Future : -1



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
E.	Intensive Agricultural Use	1.5	6.9	1	7.9	+0.5
I.	Poor Land Use	1.5	6.9	2	7.8	-0.5
G.	Channel Modification	3	5.2	3	7.0	0
B.	Bank or Shoreline Development	4	2.5	7	3.0	-4
A.	Pollution	5	2.4	6	3.1	-1
C.	Environmental Intrusions	6	2.3	8	3.0	-2
H.	Water Impoundments	7	2.3	9	3.0	-1
D.	Intensive Recreational Use	8	2.2	5	3.2	+3
F.	Water Withdrawals	9	2.1	4	3.4	+5
J.	Sand and Gravel Dredging	10	1.6	10	1.9	0

Recreation: The high Mean Recreational Value (8.2) of this watershed ranks 7th statewide and supports its relative standing among the 38 streams surveyed. Its Present Worth (4th) is expected to drop one point in the future.

Problems: Intensive Agricultural Use, Intensive Recreational Use, and Poor Land Use were ranked as the top three present problems of the watershed by respondents. Respondents also feel the top three problems in the future will be Intensive Recreational Use, Intensive Agricultural Use, and Bank and Shoreline Development. All future problem categories are expected to increase, though only Intensive Recreational Use will move into the Severe category.

Discussion: While all future problems are expected to increase, respondents felt that most will rank in the Moderate category. This stream once was a candidate for the national scenic rivers program and more recently has been listed in its entirety on the Department of the Interior's Nationwide Rivers Inventory.

TABLE 22

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Gasconade River

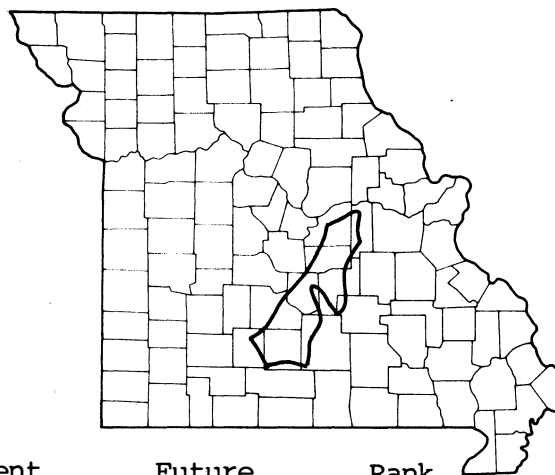
Number of Respondents: 37

Mean Rec. Value On A Scale Of 1-10 : 8.2

Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 4

Future Worth : 5

Change In Rank, Present to Future : -1



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
E.	Intensive Agricultural Use	1	5.4	2	6.8	-1
D.	Intensive Recreational Use	2	5.3	1	7.6	+1
I.	Poor Land Use	3	4.9	4	6.5	-1
B.	Bank or Shoreline Development	4	4.7	3	6.7	+1
A.	Pollution	5	4.5	5	6.2	0
C.	Environmental Intrusions	6	3.9	7	5.4	-1
J.	Sand and Gravel Dredging	7	3.7	8	4.9	-1
F.	Water Withdrawals	8	3.3	6	5.5	+2
G.	Channel Modification	9	2.5	9	3.9	0
H.	Water Impoundments	10	1.7	10	3.1	0

Recreation: The moderate Recreational Value of 6.5 has a standard deviation of 2.6 and a variance of 6.7. This divergence of views among the respondents may reflect the diversity of the Grand River system. The Future Worth of the river is expected to gain eight points (16th to 8th). The river's Present and Future Worth, in light of its low statewide Mean Recreational Value (23rd), indicates a considerable potential for recreational use.

Problems: The three chief problems stated as affecting present and future recreational values are Poor Land Use, Intensive Agricultural Use, and Channel Modification. The first two are now ranked in the Severe category, while all three are expected to become Severe in the future. All problem categories are expected to gain in severity in the future.

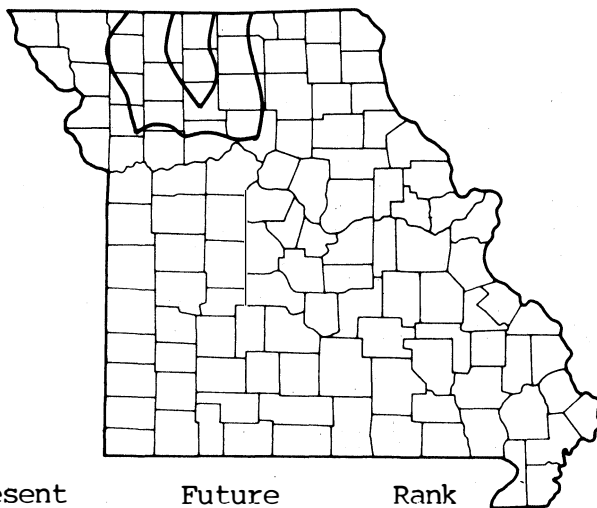
Discussion: One respondent stated current and future problems succinctly: "lack of land treatment." A pilot program of the Soil Conservation Service and accelerated farm planning for wildlife by the Department of Conservation may assist parts of this watershed to achieve its anticipated gain as a recreational resource. If these problems can be overcome, the future recreational resource value of the watershed appears to be good. Two tributaries, Marrowbone Creek and parts of Locust Creek, have been included in the Department of the Interior's Nationwide Rivers Inventory.

TABLE 23

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Grand River
Number of Respondents: 39

Mean Rec. Value On A Scale Of 1-10 : 6.5
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 16
Future Worth : 8
Change In Rank, Present to Future : +8



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
I.	Poor Land Use	1	7.4	1	8.4	0
E.	Intensive Agricultural Use	2	7.2	2	8.3	0
G.	Channel Modification	3	6.8	3	7.6	0
F.	Water Withdrawals	4	4.7	4	6.6	0
A.	Pollution	5	4.4	5	5.8	0
J.	Sand and Gravel Dredging	6	3.5	8	4.5	-2
C.	Environmental Intrusions	7	3.5	9	4.3	-2
H.	Water Impoundments	8	3.5	6	5.2	+2
D.	Intensive Recreational Use	9	3.4	7	4.9	+2
B.	Bank or Shoreline Development	10	2.6	10	3.7	0

Recreation: In spite of the Moderate category of the stream's Mean Recreational Value (6.3), its Present Worth ranks the lowest among the 38 streams surveyed. It is, however, expected to gain by two points in the future. The statewide ranking of the Mean Recreation Value ranks 26th, well above Present and Future Worth, indicating some resource potential.

Problems: Channel Modification tied with Poor Land Use for the top-ranked current problem; Intensive Agricultural Use was close behind. All were in the Moderate category. Respondents feel the three problem categories will become Severe in the future and will remain the chief problems of the watershed. All future categories are expected to gain in mean scores.

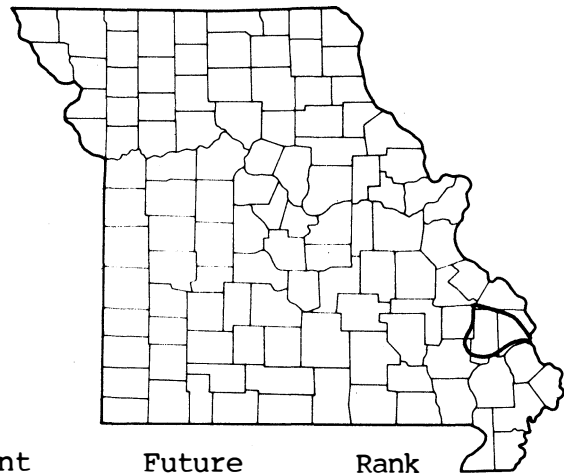
Discussion: This stream appears to possess some potential as a future recreational resource if problems can be controlled.

TABLE 24

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Headwater Diversion
Number of Respondents: 14

Mean Rec. Value On A Scale Of 1-10 : 6.3
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 38
Future Worth : 36
Change In Rank, Present to Future : +2



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
G.	Channel Modification	1.5	6.7	2	8.2	-1.5
I.	Poor Land Use	1.5	6.7	3	8.1	-1.5
E.	Intensive Agricultural Use	3	6.6	1	8.4	+2
D.	Intensive Recreational Use	4	4.4	4	6.2	0
C.	Environmental Intrusions	5.5	4.1	8	5.4	-2.5
F.	Water Withdrawals	5.5	4.1	6	6.0	-0.5
A.	Pollution	7	4.0	5	6.1	+2
H.	Water Impoundments	8	3.9	7	5.4	+1
J.	Sand and Gravel Dredging	9	3.8	9	4.9	0
B.	Bank or Shoreline Development	10	3.3	10	4.5	0

Recreation: The Mean Recreational Value (9.2) of the Jacks Fork watershed is second only to the Current River (9.3). Its Present Worth is fifth, with a Future Worth of five points less (10th).

Problems: Present perceived problems are Intensive Recreational Use, Poor Land Use, and Bank or Shoreline Development. Intensive Recreational Use is rated as Severe. This category is expected to remain as the chief problem in the future with a gain of 2 points (9.1). Several rank changes are expected to occur, with Pollution, Environmental Intrusions, and Sand and Gravel Dredging showing the greatest changes outside the Ozark National Scenic Riverways. Respondents noted pollution concerns ranging from municipal to heavy metal pollution. Several respondents singled out Sand and Gravel Dredging in the headwaters as a major problem.

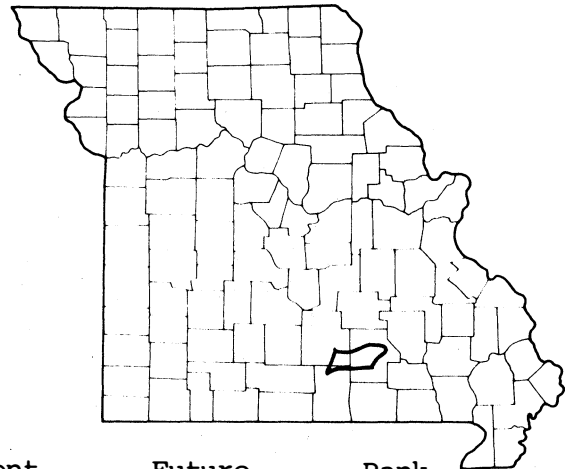
Discussion: The slippage in Future Recreational Worth parallels the fate of the Current. In both cases, future Intensive Recreational Use is perceived to be the principal factor. In spite of being protected by National Scenic Riverways status, these streams are viewed as becoming less valuable as recreational resources in the future. This may indicate a feeling that these problems cannot be overcome.

TABLE 25

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Jacks Fork River
Number of Respondents: 19

Mean Rec. Value On A Scale Of 1-10 : 9.2
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 5
Future Worth : 10
Change In Rank, Present to Future : -5



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	7.0	1	9.1	0
I.	Poor Land Use	2	3.3	4.5	3.9	-2.5
B.	Bank or Shoreline Development	3	3.1	6	3.7	-3
C.	Environmental Intrusions	4.5	2.9	2	4.2	+2.5
J.	Sand and Gravel Dredging	4.5	2.9	3	4.0	+1.5
E.	Intensive Agricultural Use	6	2.5	8	3.1	-2
G.	Channel Modification	7	2.2	7	3.3	0
F.	Water Withdrawals	8	2.0	9	2.6	-1
A.	Pollution	9	1.8	4.5	3.9	+4.5
H.	Water Impoundments	10	1.5	10	2.3	0

Recreation: A Mean Recreational Value of 6.5 places this stream in the Moderate category. Respondents ranked the Present Worth at 17th. Its Future Worth is expected to gain by +3 points. Both are well above the statewide Mean Recreational Value ranking of 21st.

Problems: Pollution is ranked as the principal problem now and in the future and is expected to become even more critical. Intensive Recreational Use and Water Withdrawals rank in the Moderate category but are expected to become Severe in the future. Bank and Shoreline Development will also become Severe. Water Impoundments will increase three places and become Severe in magnitude.

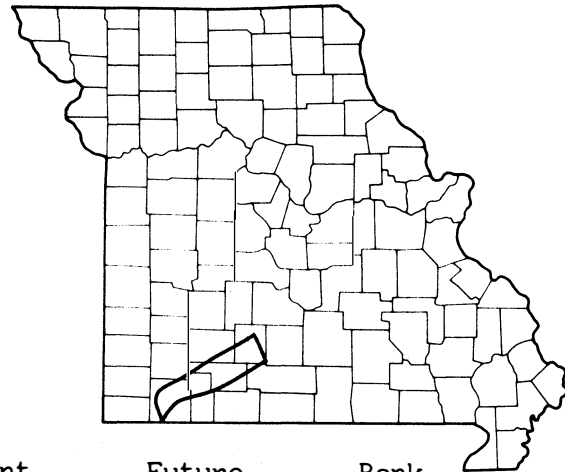
Discussion: The proximity of this stream to the City of Springfield is both a great recreational asset and a liability. Future pressures of human use from municipal and industrial water needs, sewage disposal and recreational uses suggests the potential for substantial conflicts in use. The future development of the proposed County Line Dam is also viewed as a problem by respondents. The ranking indicates that the potential of this resource for recreation is great and warrants seeking solutions to the perceived problems.

TABLE 26

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: James River
Number of Respondents: 21

Mean Rec. Value On A Scale Of 1-10 : 6.5
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 17
Future Worth : 14
Change In Rank, Present to Future : +3



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
A.	Pollution	1	7.8	1	9.0	0
D.	Intensive Recreational Use	2	5.4	2.5	7.5	-0.5
F.	Water Withdrawals	3	5.2	2.5	7.5	+0.5
B.	Bank or Shoreline Development	4	5.1	4	7.5	0
E.	Intensive Agricultural Use	5	4.7	7	5.9	-2
I.	Poor Land Use	6	4.4	8	5.9	-2
C.	Environmental Intrusions	7	4.1	6	6.1	+1
H.	Water Impoundments	8	4.1	5	6.9	+3
J.	Sand and Gravel Dredging	9	3.1	10	4.7	-1
G.	Channel Modification	10	3.1	9	4.9	+1

Recreation: The Mean Recreation Value for the Lamine River is 6.0, which ranks it 27th statewide. The Present Worth of 30 indicates a resource potential that has not been realized. The Future Recreational Worth (28th) suggests that this potential might be achieved.

Problems: Poor Land Use, Intensive Agricultural Use, and Channel Modification are ranked as the chief limitations to Present Recreational Value. Of these, Poor Land Use and Intensive Agricultural Use are anticipated to become Severe in the future. All problem categories are expected to gain in severity.

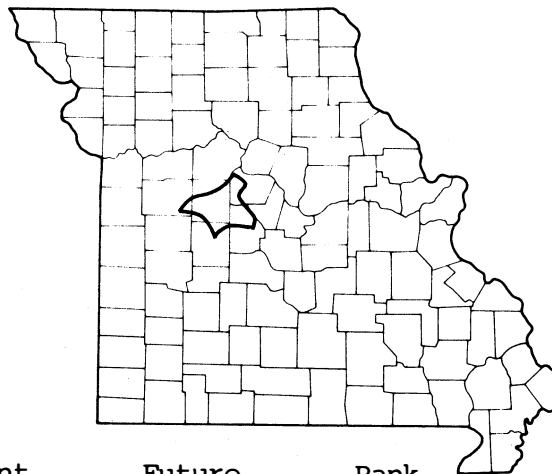
Discussion: The present work substantiates the findings of a study by the Soil Conservation Service. Their analysis found that the Lamine system has values of above-average environmental quality. These qualities take on more importance given the river's proximity to a major metropolitan area.

TABLE 27

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Lamine River
Number of Respondents: 23

Mean Rec. Value On A Scale Of 1-10 : 6.0
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 30
Future Worth : 28
Change In Rank, Present to Future : +2



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
I.	Poor Land Use	1	6.6	1.5	7.6	-0.5
E.	Intensive Agricultural Use	2	6.3	1.5	7.6	+0.5
G.	Channel Modification	3	4.3	3	5.8	0
A.	Pollution	4	4.0	4	5.5	0
F.	Water Withdrawals	5	3.8	5	5.2	0
B.	Bank or Shoreline Development	6	3.6	7	4.5	-1
D.	Intensive Recreational Use	7	3.2	6	4.8	+1
C.	Environmental Intrusions	8	3.2	8	4.0	0
H.	Water Impoundments	9	3.1	9	3.9	0
J.	Sand and Gravel Dredging	10	2.8	10	3.5	0

Recreation: The river's Mean Recreational Value (9.2), ranks third state-wide. The Future Worth of the Meramec is expected to slip one point.

Problems: Currently, Intensive Recreational Use, Bank or Shoreline Development, and Sand and Gravel Dredging are the top three ranked problems. Respondents felt that Intensive Recreational Use is now Severe. Pollution will replace Sand and Gravel Dredging as the third-ranked problem in the future. All four problems will become Severe in magnitude.

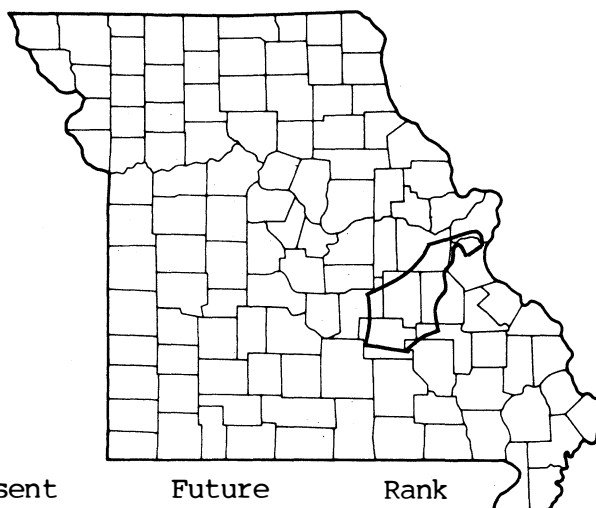
Discussion: Several respondents noted the futility of providing one value for the various recreation and problem categories. A few respondents noted that their values were for the upper river or for the lower river. These comments indicate the diversity of this river system and a weakness in the approach of this survey. Two major tributaries, Courtois Creek and Huzzah Creek, plus a major portion of the upper Meramec River have been included in the Nationwide Rivers Inventory (Department of the Interior, 1981). If the Corps of Engineers' current river basin plan is deauthorized, then the river's proximity to greater St. Louis will offer a challenging opportunity to maintain the river's recreational values. The Future Mean Scores for all ten problem categories suggest that the challenges will be many and great.

TABLE 28

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Meramec River
Number of Respondents: 42

Mean Rec. Value On A Scale Of 1-10 : 9.2
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 2
Future Worth : 3
Change In Rank, Present to Future : -1



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	7.5	1	9.4	0
B.	Bank or Shoreline Development	2	6.4	2	8.3	0
J.	Sand and Gravel Dredging	3	5.9	4	7.5	-1
A.	Pollution	4	5.8	3	7.9	+1
I.	Poor Land Use	5	5.3	5	6.9	0
E.	Intensive Agricultural Use	6	4.8	7	6.3	-1
C.	Environmental Intrusions	7	4.8	9	6.1	-2
G.	Channel Modification	8	4.1	10	5.8	-2
F.	Water Withdrawals	9	3.8	6	6.5	+3

Recreation: The Upper Mississippi River was given a Mean Recreational Value of 8.2 by the 53 respondents rating this resource (ranking 6th). The Present Recreational Rank of 8th is expected to gain 6 points in the future, making this river system's future second only to the Missouri River. This increase indicates great recreational resource potential.

Problems: Pollution, Channel Modification, and Poor Land Use ranked first, second, and third, respectively, as present and future problems. All three are currently of Moderate severity but are expected to become Severe. Water Withdrawals gained four points between present (10th) and future (6th) rank. Other problems noted by respondents included commercial barge traffic, lack of access, and clearing of land in the floodplain.

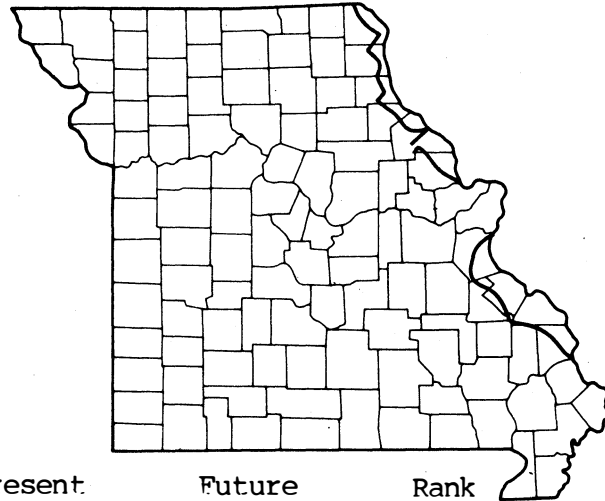
Discussion: The Upper Mississippi above St. Louis has often been referred to as a "river-lake" because the reach is controlled by locks and dams. Its proximity to urban centers and the diversity of recreational use accounts for much of its resource potential. The reach below St. Louis offers fewer developed recreation sites according to the Great River Resource Management Study (Oblinger-McCaleb, 1981).

TABLE 29

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Mississippi River, Upper
Number of Respondents: 53

Mean Rec. Value On A Scale Of 1-10 : 8.2
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 8
Future Worth : 2
Change In Rank, Present to Future : +6



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
A.	Pollution	1	6.9	1	8.4	0
G.	Channel Modification	2	6.9	2	8.3	0
I.	Poor Land Use	3	6.6	3	7.6	0
H.	Water Impoundments	4	5.7	4	6.7	0
C.	Environmental Intrusions	5	4.9	8	6.0	-3
B.	Bank or Shoreline Development	6	4.8	7	6.1	-1
D.	Intensive Recreational Use	7	4.8	5	6.6	+2
J.	Sand and Gravel Dredging	8	4.8	9	5.6	-1
E.	Intensive Agricultural Use	9	4.5	10	5.4	-1
F.	Water Withdrawals	10	4.4	6	6.2	+4

Recreation: The Mean Recreational Value of the Missouri River (7.3) is ranked 15th. Its Present Worth is 6th but the river's Future Recreational Value is expected to become Number One. This makes the Missouri River a future resource of great significance, in the respondents' estimation.

Problems: Channel Modification is seen as the most Severe problem facing the river, now and in the future. The upward shift in the Future Worth may reflect optimism about efforts to improve habitat diversity within the watershed. Pollution and Poor Land Use currently rank second and third and are Severe in magnitude. Water Withdrawal replaces Poor Land Use as the third-ranked problem in the future. It is expected to increase by almost three points, to become Severe in nature. All future problem categories are expected to increase. Several respondents noted concern for other problems such as poor access, commercial navigation, and lack of public information about the river.

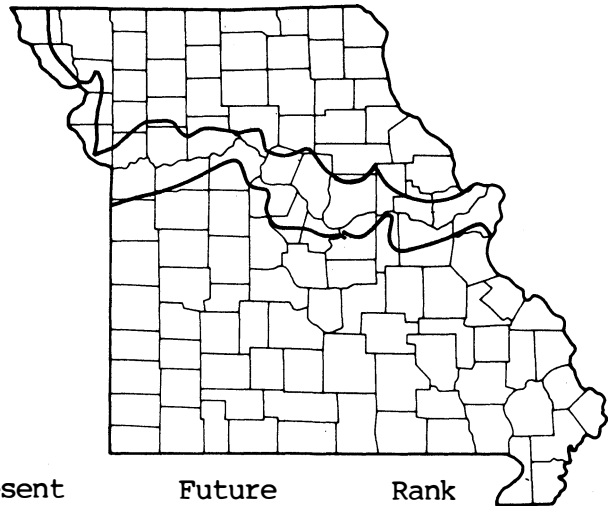
Discussion: Approximately two-thirds of the state's population is within easy access of the Missouri River. A study entitled "Directions For Recreation An Overview Of the Missouri River" (Pershall & Guthrie, 1980) suggests that programs which increase the river's recreational value will be met with public support. One tributary, Cedar Creek in eastern Boone County, has been listed in the Department of the Interior's Nationwide Rivers Inventory.

TABLE 30

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Missouri River
Number of Respondents: 85

Mean Rec. Value On A Scale Of 1-10 : 7.3
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 6
Future Worth : 1
Change In Rank, Present to Future : +5



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
G.	Channel Modification	1	8.3	1	8.9	0
A.	Pollution	2	7.3	2	8.5	0
I.	Poor Land Use	3	7.0	4	7.9	-1
E.	Intensive Agricultural Use	4	5.8	5	6.7	-1
F.	Water Withdrawals	5	5.4	3	8.0	+2
J.	Sand and Gravel Dredging	6	5.2	7	6.1	-1
H.	Water Impoundments	7	5.0	6	6.2	+1
C.	Environmental Intrusions	8	4.3	9	5.2	-1
D.	Intensive Recreational Use	9	4.0	8	5.9	+1
B.	Bank or Shoreline Development	10	3.7	10	4.8	0

Recreation: The Moreau River is currently ranked 35th among the 38 watersheds surveyed and is expected to slightly improve its standing in the future. Respondents gave a Moderate Mean Recreational Value of 4.6 to this stream.

Problems: Intensive Agricultural Use, Poor Land Use, and Pollution lead the list of problems currently confronting the recreational value of this stream. The first two problem categories will become Severe in the future, while most other problem categories are expected to reach Moderate severity.

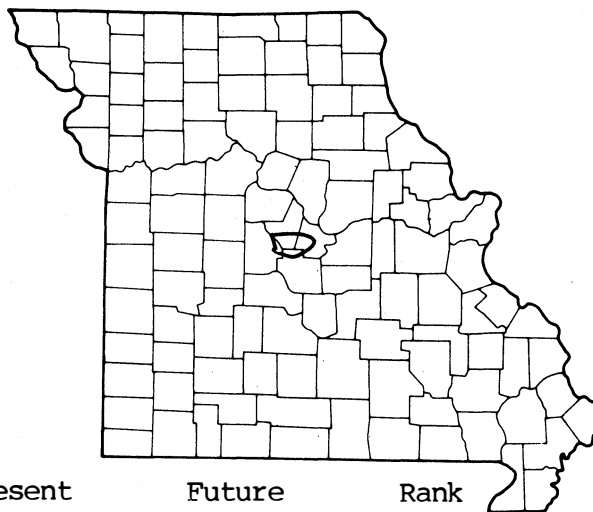
Discussion: The Moreau River is a south-bank tributary of the Missouri River which encircles half of Jefferson City. The increase in the rank of future problem categories may be due to the river's perceived recreational value to this urban area. The statewide ranking of the Mean Recreational Value is 34th; since this ranking is the same as the Present Worth and Future Worth rankings, this watershed is probably at its resource potential.

TABLE 31

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Moreau River
Number of Respondents: 16

Mean Rec. Value On A Scale Of 1-10 : 4.6
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 35
Future Worth : 34
Change In Rank, Present to Future : +1



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
E.	Intensive Agricultural Use	1	6.8	1	8.0	0
I.	Poor Land Use	2	6.7	2	7.4	0
A.	Pollution	3	4.4	3	5.7	0
G.	Channel Modification	4	3.9	4	5.2	0
B.	Bank or Shoreline Development	5	3.3	6.5	4.7	-1.5
C.	Environmental Intrusions	6	3.3	6.5	4.7	-0.5
D.	Intensive Recreational Use	7	3.2	5	4.9	+2
F.	Water Withdrawals	8	3.0	8	4.2	0
J.	Sand and Gravel Dredging	9	2.7	10	3.2	-1
H.	Water Impoundments	10	2.2	9	3.5	+1

Recreation: The Niangua has a Mean Recreational Value of 8.1 and ranks 8th in the state. Respondents assigned a Present Recreational Worth of 9th place and a Future Worth of 19th place, a significant reduction of 10 points.

Problems: Intensive Recreational Use, Intensive Agricultural Use, and Poor Land Use are perceived as the principal problems limiting recreational value. All are Moderate in severity. These problems also are perceived as major future problems. Intensive Recreational Use is expected to become Severe. Pollution is also anticipated to gain in severity in the future. Other problems mentioned by respondents were: burning within the watershed, residential sewage, timber-to-pasture conversion, and too many canoes.

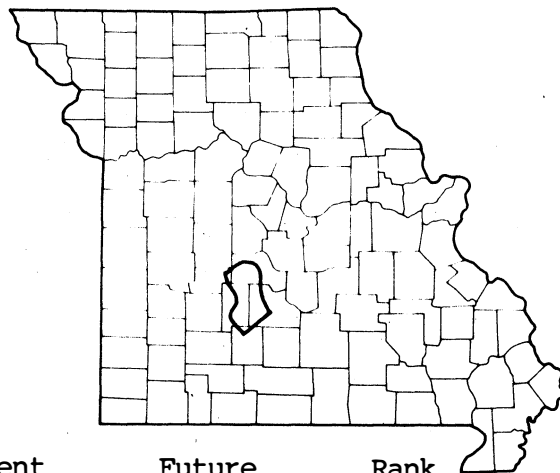
Discussion: The Niangua, like the Current and Jacks Fork rivers, receives heavy recreational use. All three rivers seem prone to the same fate--a decline in future recreation ranking. A corresponding gain in the ranking of streams nearer to urban centers suggests that the respondents may anticipate future stream users to travel less to enjoy river recreation.

TABLE 32

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Niangua River
Number of Respondents: 20

Mean Rec. Value On A Scale Of 1-10 : 8.1
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 9
Future Worth : 19
Change In Rank, Present to Future :-10



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	6.7	1	8.6	0
E.	Intensive Agricultural Use	2	5.3	2	6.7	0
I.	Poor Land Use	3	4.7	3	6.4	0
B.	Bank or Shoreline Development	4	4.2	4	6.2	0
H.	Water Impoundments	5	3.9	8	4.7	-3
J.	Sand and Gravel Dredging	6	3.9	6	5.1	0
C.	Environmental Intrusions	7	3.7	7	5.1	0
A.	Pollution	8	3.3	5	5.3	+3
G.	Channel Modification	9	3.1	9	4.5	0
F.	Water Withdrawals	10	2.8	10	4.2	0

Recreation: The Mean Recreational Value computed for this stream (4.8) places it in the Moderate category. The watershed presently ranks 29th among the 38 surveyed. Respondents expect the Future Worth of this stream to gain by 2 points.

Problems: Respondents feel that Intensive Agricultural Use, Poor Land Use, and Channel Modification are the principal problems confronting recreational use now and in the future. Currently, the first two problem categories rank in the Severe category. However, all three are expected to become Severe in the future. Intensive Recreational Use will also gain in rank and mean score value. Lack of public ownership was listed as an "other" problem category.

Discussion: A comparison of the Mean Recreational Value (32nd) to the Recreational Worth rankings indicates the stream has a moderate value as a regional recreation resource. The Nodaway River is close to the urban population center of St. Joseph. Perceived increases in recreational use will probably come from this area.

TABLE 33

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Nodaway River
Number of Respondents: 17

Mean Rec. Value On A Scale Of 1-10 : 4.8
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 29
Future Worth : 27
Change In Rank, Present to Future : +2



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
E.	Intensive Agricultural Use	1.5	7.2	2	8.3	-0.5
I.	Poor Land Use	1.5	7.2	1	8.5	+0.5
G.	Channel Modification	3	6.6	3	7.6	0
F.	Water Withdrawals	4	4.6	4	6.6	0
A.	Pollution	5	4.5	5	5.8	0
C.	Environmental Intrusions	6	3.3	9	3.9	-3
H.	Water Impoundments	7	3.3	6	4.9	+1
B.	Bank or Shoreline Development	8	3.2	8	4.2	0
D.	Intensive Recreational Use	9	3.1	7	4.5	+2
J.	Sand and Gravel Dredging	10	2.7	10	3.6	0

Recreation: The North River is currently ranked 34th among the 38 watersheds surveyed. Its recreational ranking is expected to drop to 35th in the future. Its Mean Recreation Value on a scale of one to ten is 4.0.

Problems: Respondents indicate that Intensive Agricultural Use, Poor Land Use, and Channel Modification are the chief problems affecting the recreational value of the watershed. Intensive Agricultural Use and Poor Land Use are now ranked in the Severe category and are expected to become more severe in the future.

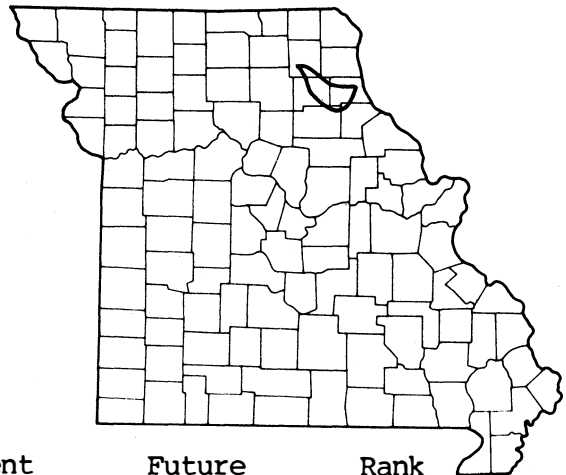
Discussion: The North River watershed may be an example of a resource reduced in recreation value by land-use changes and intensive agricultural use.

TABLE 34

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: North River
Number of Respondents: 13

Mean Rec. Value On A Scale Of 1-10 : 4.0
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 34
Future Worth : 35
Change In Rank, Present to Future : -1



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
E.	Intensive Agricultural Use	1	7.5	1	8.8	0
I.	Poor Land Use	2	7.5	2	8.4	0
G.	Channel Modification	3	5.5	3	6.8	0
F.	Water Withdrawals	4	4.0	4	5.8	0
A.	Pollution	5	3.4	5	4.2	0
C.	Environmental Intrusions	6	3.2	6	3.9	-1
H.	Water Impoundments	7	3.1	7	3.9	0
D.	Intensive Recreational Use	8	2.8	9	3.7	-1
J.	Sand and Gravel Dredging	9	2.6	8	3.9	+2
B.	Bank or Shoreline Development	10	2.4	10	3.2	0

Recreation: The Mean Recreational Value of 7.3 indicates that respondents assigned a high recreation value. The Future Worth (9th) is a slight gain over Present Worth (10th). This is well above the ranking of the Mean Recreational Value (16th) indicating that the watershed has regional significance.

Problems: Respondents feel that Water Impoundments are now the chief problem limiting recreational value and are likely to become Severe in the future. Bank and Shoreline Development is the second-ranked problem in terms of severity but will be tied with Intensive Recreational Use in the future. In round numbers, both may become Severe in the future. Poor Land Use currently is the third-ranked problem.

Discussion: The Eastern Osage is defined as that part of the river system downstream from Warsaw, Missouri. Recent problems with reservoir releases from the new Harry S Truman Dam and continuing problems with releases from the long-established Bagnell Dam may have been in the minds of respondents who ranked this as the chief problem. The recreational potential of this resource warrants effort in seeking solutions to the problems.

TABLE 35

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Osage River, Eastern

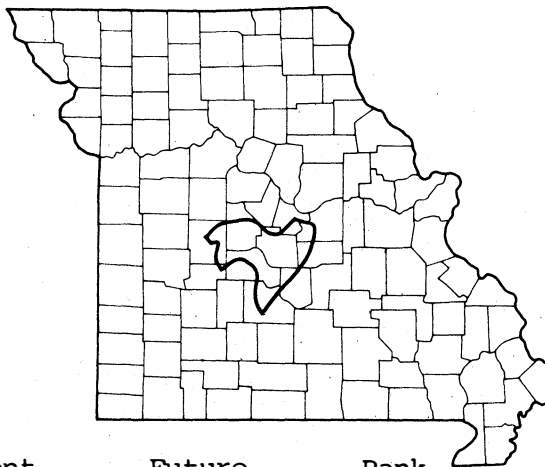
Number of Respondents: 28

Mean Rec. Value On A Scale Of 1-10 : 7.3

Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 10

Future Worth : 9

Change In Rank, Present to Future : +1



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
H.	Water Impoundments	1	6.6	1	7.2	0
B.	Bank or Shoreline Development	2	5.4	2.5	6.9	-0.5
I.	Poor Land Use	3	5.2	4	6.1	-1
D.	Intensive Recreational Use	4	5.2	2.5	6.9	+1.5
E.	Intensive Agricultural Use	5	5.1	5	6.0	0
G.	Channel Modification	6	4.7	7	5.7	-1
A.	Pollution	7	4.1	6	5.8	+1
F.	Water Withdrawals	8	3.9	8	5.0	0
J.	Sand and Gravel Dredging	9	3.8	10	4.5	-1
C.	Environmental Intrusions	10	3.8	9	4.7	+1

Recreation: The Mean Recreational Value of the watershed is in the High category (8). If present problems can be solved, the statewide rank is anticipated to increase from 22nd to 15th, an improvement of 7 points. This increase and the high ranking of the Mean Recreational Value (10th) indicates that respondents see great recreational potential in this watershed's streams.

Problems: Table 36 indicates that Impoundments, Poor Land Use, and Intensive Agricultural Use are ranked as the top three problems on the Western Osage watershed. Each ranks in the Moderate category (4-6). Impoundments and Poor Land Use are expected to become Severe (7.9 and 7.6) problems in the future. Respondents also anticipate that Intensive Recreational Use will replace Intensive Agricultural Use as the third-ranked problem category in the future.

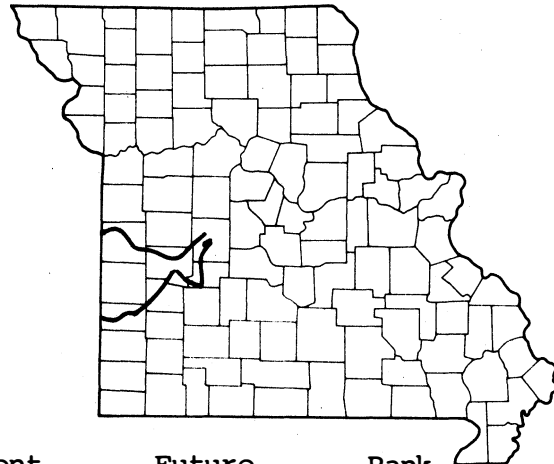
Discussion: The watershed's accessibility to urban centers in west-central and southwest Missouri enhances its potential as a future recreation resource. Problems associated with Harry S Truman Reservoir and with impoundments in the upper river basin may be the sources of concern among respondents. Uncertainty over water withdrawals by the State of Kansas may also be a contributing factor.

TABLE 36

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Osage River, Western
Number of Respondents: 26

Mean Rec. Value On A Scale Of 1-10 : 8.0
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 21
Future Worth : 16
Change In Rank, Present to Future : +5



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
H.	Water Impoundments	1	6.6	1	7.9	0
I.	Poor Land Use	2	6.5	2	7.6	0
E.	Intensive Agricultural Use	3	5.5	4	6.5	-1
G.	Channel Modification	4	5.3	6	6.0	-2
D.	Intensive Recreational Use	5	4.8	3	7.3	+2
A.	Pollution	6	4.7	5	6.3	+1
F.	Water Withdrawals	7	4.1	7	5.7	0
B.	Bank or Shoreline Development	8	3.9	8	5.5	0
C.	Environmental Intrusions	9	3.6	9	4.9	0
J.	Sand and Gravel Dredging	10	2.6	10	3.5	0

Recreation: Respondents assigned a Mean Recreational Value of 6.9, a border-line high-value stream. The present Recreational Rank of 22 is expected to gain 7 points in the future and become 15th statewide.

Problems: Poor Land Use, Intensive Recreational Use, and Channel Modification rank first, second, and third, respectively, now and in the future. The first two categories currently are in the Severe category. All three are expected to become Severe in the future. Lack of public ownership was also listed as a problem by several respondents.

Discussion: The gain in recreational ranking in the future may be due to the stream's proximity to urban centers in western Missouri. The relatively low score for Intensive Recreational Use is not expected to gain in relation to other problem categories, suggesting that this stream can accommodate more recreational use.

TABLE 37

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Platte River
Number of Respondents: 28

Mean Rec. Value On A Scale Of 1-10 : 6.9
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 22
Future Worth : 15
Change In Rank, Present to Future : +7



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
I.	Poor Land Use	1	7.4	1	8.4	0
E.	Intensive Agricultural Use	2	7.4	2	8.4	0
G.	Channel Modification	3	6.3	3	7.3	0
D.	Intensive Recreational Use	4	4.3	6	6.1	-2
F.	Water Withdrawals	5	3.9	4	6.3	+1
H.	Water Impoundments	6	3.8	7	5.2	-1
A.	Pollution	7	3.7	5	6.2	+2
C.	Environmental Intrusions	8	3.0	9	4.1	-1
B.	Bank or Shoreline Development	9	2.8	8	4.3	+1
J.	Sand and Gravel Dredging	10	2.3	10	3.7	0

Recreation: The Mean Recreational Value of this watershed is rated in the High category (7.1). Unlike the other two watersheds in this basin, the Future Recreational Worth is anticipated by respondents to fall from 15th to 22nd.

Problems: Table 38 indicates that impoundments represent the chief problem, now and in the future. The problem is anticipated to increase (6.8) in the future. Intensive Recreational Use and Poor Land Use currently are the second and third most important problems. Their significance is expected to increase in the future, along with Bank or Shoreline Development.

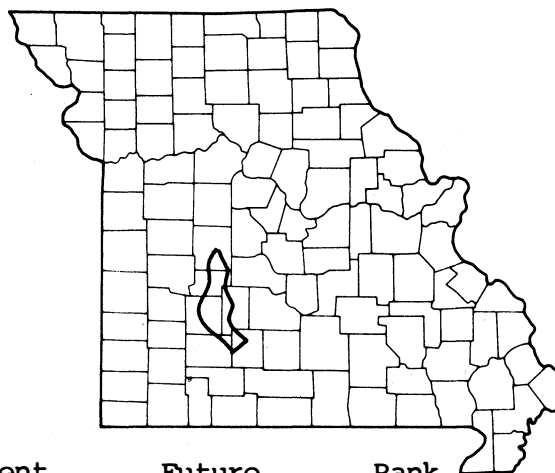
Discussion: The future loss in recreational ranking of the watershed may seem an anomaly in the data, especially when comparing the gain in rank of the Sac (+3) and Western Osage (+5). (All three watersheds serve the same population centers, and concern focused on the problems of Water Impoundments.) The ranking of the Mean Recreational Value (17th) makes the expected drop in the Future Worth of the Pomme de Terre watershed even more perplexing. It is assumed that there are other limiting factors which did not surface in this survey.

TABLE 38

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Pomme De Terre River
Number of Respondents: 32

Mean Rec. Value On A Scale Of 1-10 : 7.1
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 15
Future Worth : 22
Change In Rank, Present to Future : -7



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
H.	Water Impoundments	1	5.5	1	6.8	0
D.	Intensive Recreational Use	2	5.0	2	6.6	0
I.	Poor Land Use	3	4.7	4	5.9	-1
B.	Bank or Shoreline Development	4	4.4	3	6.0	+1
E.	Intensive Agricultural Use	5	4.4	5	5.7	0
G.	Channel Modification	6	3.8	7	5.2	-1
C.	Environmental Intrusions	7	3.7	6	5.4	+1
A.	Pollution	8	3.4	8	5.0	0
F.	Water Withdrawals	9	3.1	9	4.9	0
J.	Sand and Gravel Dredging	10	3.1	10	4.2	0

Recreation: The Mean Recreational Value of the watershed according to respondents is in the Moderate Category (6.4). The statewide ranking of the watershed's recreational Worth is expected to gain from a current ranking of 23rd to 20th, an improvement of 3 points.

Problems: Table 39 indicates that, like the Western Osage and Pomme de Terre watersheds, Impoundments, Poor Land Use, and Intensive Agricultural Use currently are the top three problems. All three are ranked in the Moderate category. Intensive Agricultural Use is expected to become Severe in the future. Other problems written in by respondents include cutting of riparian timber and landfill operations.

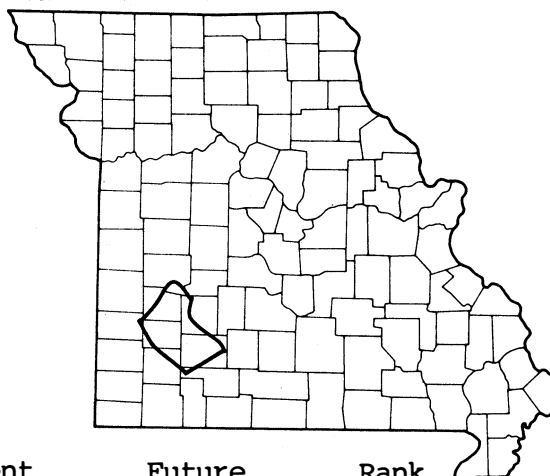
Discussion: Respondents indicated that problems associated with regulated flows from Stockton Reservoir apparently will become less severe in the future. Attitudes on this point may change once the Corps of Engineers alters water flows for power generation. The proximity of the stream to urban centers in southwest Missouri may be a factor which enhances future recreational values. A major tributary, Cedar Creek, has been listed on the Department of the Interior's Nationwide Rivers Inventory.

TABLE 39

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Sac River
Number of Respondents: 28

Mean Rec. Value On A Scale Of 1-10 : 6.4
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 23
Future Worth : 20
Change In Rank, Present to Future : +3



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
H.	Water Impoundments	1	6.0	2	6.7	-1
E.	Intensive Agricultural Use	2	5.7	1	7.0	+1
I.	Poor Land Use	3	5.7	3	6.7	0
G.	Channel Modification	4	4.5	6	5.9	-2
A.	Pollution	5	4.3	4	6.5	+1
D.	Intensive Recreational Use	6	4.2	5	6.4	+1
C.	Environmental Intrusions	7	4.1	8	5.6	-1
F.	Water Withdrawals	8	3.7	7	5.7	+1
B.	Bank or Shoreline Development	9	3.2	9	4.8	0
J.	Sand and Gravel Dredging	10	3.0	10	3.9	0

Recreation: The St. Francis is a high-value resource with a Mean Recreational Value of 7.5. Presently ranked 13th among the 38 watersheds surveyed, its future standing is expected to gain 2 points.

Problems: Respondents ranked Intensive Agricultural Use, Poor Land Use, and Channel Modification as the top three problem categories. All three are Moderate in severity. Future problems are perceived to be Intensive Agricultural Use, Intensive Recreational Use, with Poor Land Use and Pollution tied for third. Comments provided by respondents indicate that Pollution may refer to either future heavy-metal mine pollution and/or agricultural chemicals. All future problems are expected to be Moderate in severity.

Discussion: The St. Francis River is a diverse system, ranging from a high-gradient upland stream to a Mississippi Delta river below Wappapello Reservoir. This diversity should be understood when interpreting the ranking of the problems affecting this diverse system. The reach from Wappapello Reservoir upstream to Syenite in St. Francois County has been included on the Department of the Interior's Nationwide Rivers Inventory.

TABLE 40

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: St. Francis River

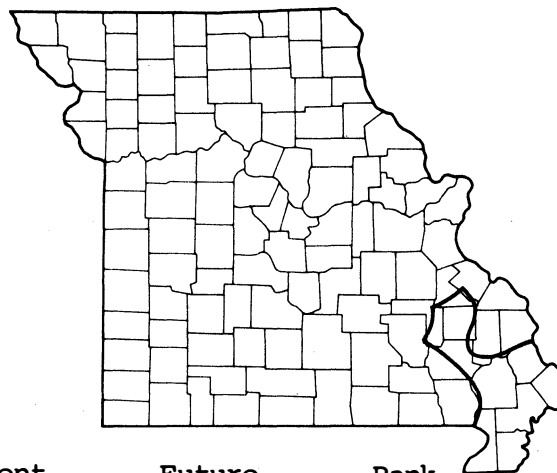
Number of Respondents: 24

Mean Rec. Value On A Scale Of 1-10 : 7.5

Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 13

Future Worth : 11

Change In Rank, Present to Future : +2



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
E.	Intensive Agricultural Use	1	5.5	1	6.8	0
I.	Poor Land Use	2	5.1	3.5	6.4	-1.5
G.	Channel Modification	3	5.0	5	6.2	-2
D.	Intensive Recreational Use	4	4.8	2	6.5	+2
H.	Water Impoundments	5	4.7	7	5.8	-2
A.	Pollution	6	4.5	3.5	6.4	+2.5
B.	Bank or Shoreline Development	7	4.0	6	5.9	+1
F.	Water Withdrawals	8	4.0	8	5.3	0
C.	Environmental Intrusions	9	3.5	9	4.9	0
J.	Sand and Gravel Dredging	10	2.8	10	4.0	0

Recreation: Respondents gave the streams of this watershed a Mean Recreational Value of 6.5. Its Present rank is placed at 19th, while its Future Worth is expected to be 12th, well above the ranking of the Mean Recreational Value (22nd).

Problems: Respondents placed both Intensive Agricultural Use and Poor Land Use in first place, rated in the Severe category. Pollution ranks third and is Moderate in severity. The top three future problems are estimated to be Intensive Agricultural Use, Poor Land Use, with Channel Modification and Water Impoundments tied for third. All three are expected to be Severe in scope. Intensive Recreational Use also gained 2 points in the future-problem ranking. Problems written in by respondents include acid drainage, agricultural, chemicals, erosion, and timber removal in the watershed.

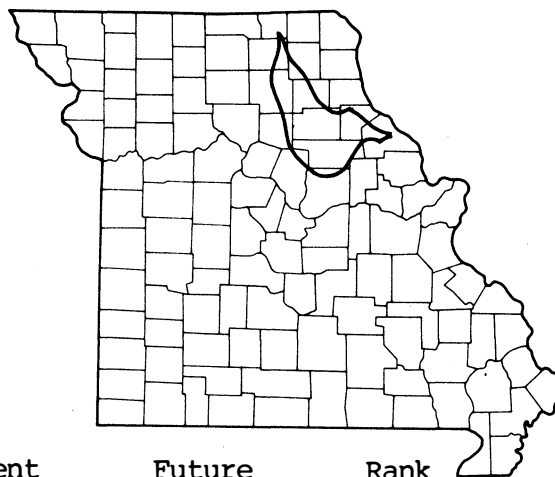
Discussion: Respondents suggested that the future operation and maintenance of Mark Twain Reservoir will be the source of both Water Impoundment and Channel Modification problems. The re-regulation pool below Mark Twain Dam may be construed as a channel-modification problem. Timber-removal and acid mine leachates are considered part of the Poor Land Use problem. The proximity of the river to urban areas may be the reason for the substantial increase in future recreational potential.

TABLE 41

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Salt River
Number of Respondents: 31

Mean Rec. Value On A Scale Of 1-10 : 6.5
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 19
Future Worth : 12
Change In Rank, Present to Future : +7



Quest.	Problems	Present		Future		Rank
		Rank	Mean	Rank	Mean	Change
E.	Intensive Agricultural Use	1.5	7.3	1	8.3	+0.5
I.	Poor Land Use	1.5	7.3	2	8.2	-0.5
A.	Pollution	3	5.3	5	7.1	-2
G.	Channel Modification	4	5.3	3.5	7.3	+0.5
H.	Water Impoundments	5	4.7	3.5	7.3	+1.5
F.	Water Withdrawals	6	4.3	6	6.2	0
C.	Environmental Intrusions	7	4.1	9	5.5	-2
B.	Bank or Shoreline Development	8	3.3	8	5.7	0
D.	Intensive Recreational Use	9	3.2	7	6.1	+2
J.	Sand and Gravel Dredging	10	3.0	10	4.4	0

Recreation: The Mean Recreational Value computed for this system (6.4) is tied in rank standing with the Sac River (24.5th). The Present Recreational Worth of 27th is expected to move up to 25th in the future.

Problems: Poor Land Use and Intensive Agricultural Use are ranked first and second, respectively, now and in the future. Respondents expect both to become Severe problems in the future. Channel Modification and Water Impoundment are ranked third and fourth, respectively, now and in the future. Both will be in the Moderate category. Other problems include flooding by Truman Reservoir and agricultural chemicals.

Discussion: Both Present and Future Recreational standings are close to the ranking of the Mean Recreational Value. This suggests that the watershed is near or at its recreational potential, in spite of its general proximity to urban centers. Uncertainty of overcoming the problems listed by respondents may be a factor. Future impoundments (Freeman Reservoir and East Branch Reservoir) and channel-modification plans may contribute to the respondents' concern.

TABLE 42

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: South Grand River
Number of Respondents: 23

Mean Rec. Value On A Scale Of 1-10 : 6.4
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 27
Future Worth : 25
Change In Rank, Present to Future : +2



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
I.	Poor Land Use	1	7.2	1	8.1	0
E.	Intensive Agricultural Use	2	6.9	2	7.7	0
G.	Channel Modification	3	6.1	3	6.8	0
H.	Water Impoundments	4	5.6	4	6.5	0
A.	Pollution	5	4.8	5	6.5	0
F.	Water Withdrawals	6	4.8	6	6.2	0
D.	Intensive Recreational Use	7	4.2	7	6.1	0
C.	Environmental Intrusions	8	4.1	8	4.9	0
B.	Bank or Shoreline Development	9	3.3	9	4.5	0
J.	Sand and Gravel Dredging	10	2.6	10	3.0	0

Recreation: The Present Recreational Value of the Spring River is ranked 28th out of the 38 watersheds surveyed. Its Future ranking of 31st represents a loss of 3 points. The Mean Recreational Value is 5.7, making the watershed a Moderate recreational resource.

Problems: According to respondents, Intensive Agricultural Use, Pollution, and Poor Land Use currently rank first, second, and third, respectively. All three are Moderate in severity. Future problems of concern to the respondents are Pollution (1st), Intensive Agricultural Use (2nd), and Water Withdrawals (3rd). Water Impoundments, with a present rank of 10th, will have a significant gain of 4 points in Future value. Several respondents referred to uncertainty over future plans for the proposed Prosperity Reservoir (now the Sylvania site).

Discussion: The big gain in the mean value for pollution may be due to the recent discovery of dioxin waste deposits in the watershed. This, plus the gain in several problem categories may be the factors behind the decline in Future Worth. The statewide rank of the Mean Recreational Value (28th) warrants protection of the watershed's regional recreational potential. Spring River, from Highway 96 to Highway 44, has been listed on the Department of the Interior's Nationwide Rivers Inventory. Shoal Creek, from its confluence with Spring River to its source, has also been listed.

TABLE 43

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Spring River
Number of Respondents: 21

Mean Rec. Value On A Scale Of 1-10 : 5.7
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 28
Future Worth : 31
Change In Rank, Present to Future : -3



Quest.	Problems	Present		Future		Rank Change
		Rank	Mean	Rank	Mean	
E.	Intensive Agricultural Use	1	5.8	2	7.3	-1
A.	Pollution	2	5.6	1	7.8	+1
I.	Poor Land Use	3	4.7	4	6.2	-1
F.	Water Withdrawals	4	4.4	3	7.0	+1
C.	Environmental Intrusions	5.5	3.6	8	4.8	2.5
D.	Intensive Recreational Use	5.5	3.6	5	5.8	+0.5
B.	Bank or Shoreline Development	7.5	2.8	9	4.4	-1.5
G.	Channel Modification	7.5	2.8	7	4.9	+0.5
J.	Sand and Gravel Dredging	9	2.6	10	4.1	-1
H.	Water Imoundments	10	2.5	6	5.0	+4

Recreation: The Thompson River is currently ranked 31st out of 38 watersheds in terms of recreational importance. Its future standing will be one point below its present ranking. The Mean Recreational Value of 4.3 places this stream in the Moderate Value category.

Problems: Respondents indicated that Poor Land Use, Intensive Agricultural Use, and Channel Modification are the top three problems affecting the watershed. Poor land Use and Intensive Agricultural Use are currently perceived as Severe in intensity. All three problems are expected to increase in the future. Water Withdrawal is expected to gain almost three points in the future. Other problems listed were lack of public ownership adjacent to the river and lack of land-treatment programs.

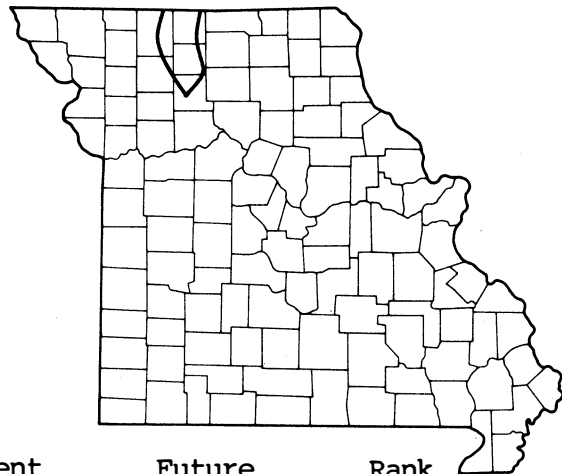
Discussion: The future mean score for Poor Land Use (9.1) should be of concern to local Soil and Water Conservation districts. The pessimism expressed for this and other problem categories may indicate extreme difficulty in achieving the recreational potential of this stream.

TABLE 44

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Thompson River
Number of Respondents: 22

Mean Rec. Value On A Scale Of 1-10 : 4.3
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 31
Future Worth : 32
Change In Rank, Present to Future : -1



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
I.	Poor Land Use	1	8.1	1	9.1	0
E.	Intensive Agricultural Use	2	8.1	2	8.9	0
G.	Channel Modification	3	6.9	3	7.8	0
F.	Water Withdrawals	4	4.4	4	7.1	0
H.	Water Impoundments	5	4.2	6	5.1	-1
A.	Pollution	6	3.7	5	5.3	+1
J.	Sand and Gravel Dredging	7	3.6	7	4.9	0
C.	Environmental Intrusions	8	3.2	8	4.4	0
D.	Intensive Recreational Use	9	2.7	9	4.3	0
B.	Bank or Shoreline Development	10	1.9	10	2.6	0

Recreation: The watershed's present rank is 11th, while its Future Worth is expected to be 6 points lower (17th). The Mean Recreational Value is in the High category (7.6) and ranks 12th in the state.

Problems: Intensive Recreational Use, Bank Shoreline Development, and Water Impoundments are the top three problems limiting the recreational value of this watershed, now and in the future. All three problem categories, plus fourth-ranked Pollution, will be Severe in intensity in the future. Boat docks were frequently mentioned as an "other" problem.

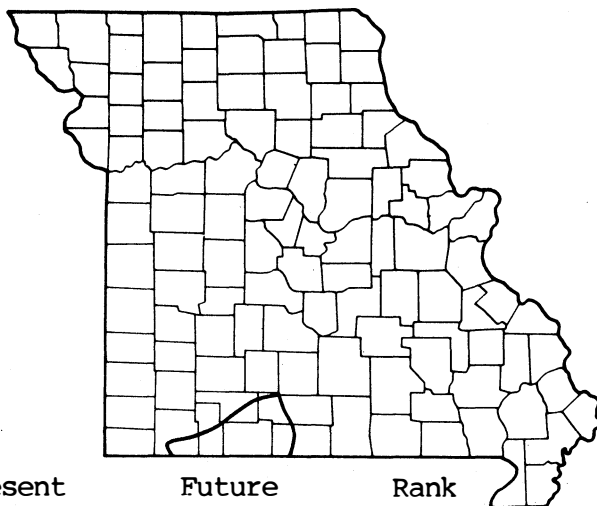
Discussion: The White River in Missouri is largely controlled by impoundments. Many respondents seemed to have rated Lake Taneycomo, a river-lake. Separation of this body of water from the other tributaries in this watershed may change its ranking. The decline in Future Worth may indicate doubts held by the respondents concerning the ability to overcome the problems.

TABLE 45

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: White River
Number of Respondents: 26

Mean Rec. Value On A Scale Of 1-10 : 7.6
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 11
Future Worth : 17
Change In Rank, Present to Future : -6



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	6.5	1	8.3	0
B.	Bank or Shoreline Development	2	5.5	2	7.5	0
H.	Water Impoundments	3	5.5	3	7.1	0
A.	Pollution	4	4.8	4	7.0	0
I.	Poor Land Use	5	4.1	6	5.7	-1
C.	Environmental Intrusions	6	4.1	5	5.8	+1
J.	Sand and Gravel Dredging	7	3.9	7	5.4	0
F.	Water Withdrawals	8	3.3	8.5	5.1	-.5
G.	Channel Modification	9	3.2	8.5	5.1	+.5
E.	Intensive Agricultural Use	10	3.2	10	5.0	0

Recreation: The Mean Recreational Value of this stream (8.0) is tied with the Western Osage River (9th), a river which offers a different recreational experience. The river's Recreational Rank currently stands at 12th but is expected to drop to 21st, a substantial drop of 9 points.

Problems: Intensive Recreational Use, Bank and Shoreline Development, and Poor Land Use are now perceived as the principal problems confronting the river's recreational values. All are Moderate in severity. Intensive Recreational Use is expected to become Severe. In the future, respondents feel Intensive Agricultural Use will replace Poor Land Use in the third-place standing. Timber-to-pasture conversion was often written in as an "other" problem.

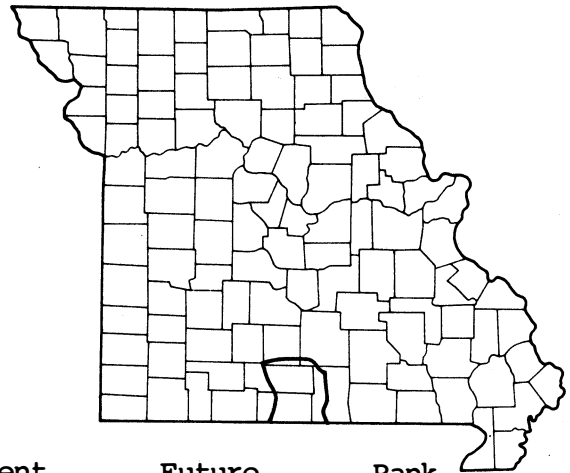
Discussion: The lower reaches of the North Fork of the White have been impounded by Norfork Reservoir; however, this was not perceived as a problem limiting stream recreation values. Heavy recreational use and a remote location may be the cause of the reduced future recreational importance of this resource. Two major segments of the North Fork of the White system have been listed on the Department of the Interior's Nationwide Rivers Inventory--North Fork of the White from Norfork Lake to the source and Bryant Creek from the North Fork to Highway 14.

TABLE 46

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: North Fork White River
Number of Respondents: 18

Mean Rec. Value On A Scale Of 1-10 : 8.0
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 12
Future Worth : 21
Change In Rank, Present to Future : -9



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
D.	Intensive Recreational Use	1	6.5	1	8.2	0
B.	Bank or Shoreline Development	2	4.5	2	6.3	0
I.	Poor Land Use	3	4.0	4	5.2	-1
E.	Intensive Agricultural Use	4	3.7	3	5.6	+1
C.	Environmental Intrusions	5	3.4	5	4.9	0
J.	Sand and Gravel Dredging	6	3.2	6	4.5	0
A.	Pollution	7	2.3	9	3.2	-2
G.	Channel Modification	8	2.2	8	3.3	0
H.	Water Impoundments	9	2.2	7	3.4	+2
F.	Water Withdrawals	10	2.1	10	3.0	0

Recreation: With a Present Worth of 37th and Future Worth of 38th, the ten respondents rating this stream still assigned a Mean Recreational Value of 4.2. This rating falls in the Moderate category and is ranked 36th in the state.

Problems: Respondents feel that Intensive Agricultural Use, Poor Land Use and Channel Modification will be the chief problems in the future. Intensive Agricultural Use, Poor Land Use will become Severe. Water Withdrawals, Pollution and Intensive Recreational Use are also expected to gain as problem areas in the future.

Discussion: The watershed's Mean Recreational Value of 4.2, compared to its Present rank of 37th demonstrates that even the lowest ranked streams have at least Moderate recreational value.

TABLE 47

REGIONAL ASSESSMENT OF RECREATIONAL VALUES AND PROBLEMS BY WATERSHED

Watershed: Wyaconda River
Number of Respondents: 10

Mean Rec. Value On A Scale Of 1-10 : 4.2
Recreational Rank Compared To The
Other 37 Watersheds, Present Worth : 37
Future Worth : 38
Change In Rank, Present to Future : -1



<u>Quest.</u>	<u>Problems</u>	<u>Present</u>		<u>Future</u>		<u>Rank Change</u>
		<u>Rank</u>	<u>Mean</u>	<u>Rank</u>	<u>Mean</u>	
E.	Intensive Agricultural Use	1	6.1	1	7.2	0
I.	Poor Land Use	2	5.8	2	7.0	0
G.	Channel Modification	3	4.6	3	6.1	0
C.	Environmental Intrusions	4	2.5	7.5	3.1	-2.5
F.	Water Withdrawals	5	2.5	4	4.0	+1
H.	Water Impoundments	6	2.5	6	3.3	-1
A.	Pollution	7	2.4	5	3.6	+2
B.	Bank or Shoreline Development	8	2.2	9	3.0	-1
D.	Intensive Recreational Use	9	2.0	7.5	3.1	+1.5
J.	Sand and Gravel Dredging	10	1.5	10	2.1	0

